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AUTOMOTIVE INDUSTRIES

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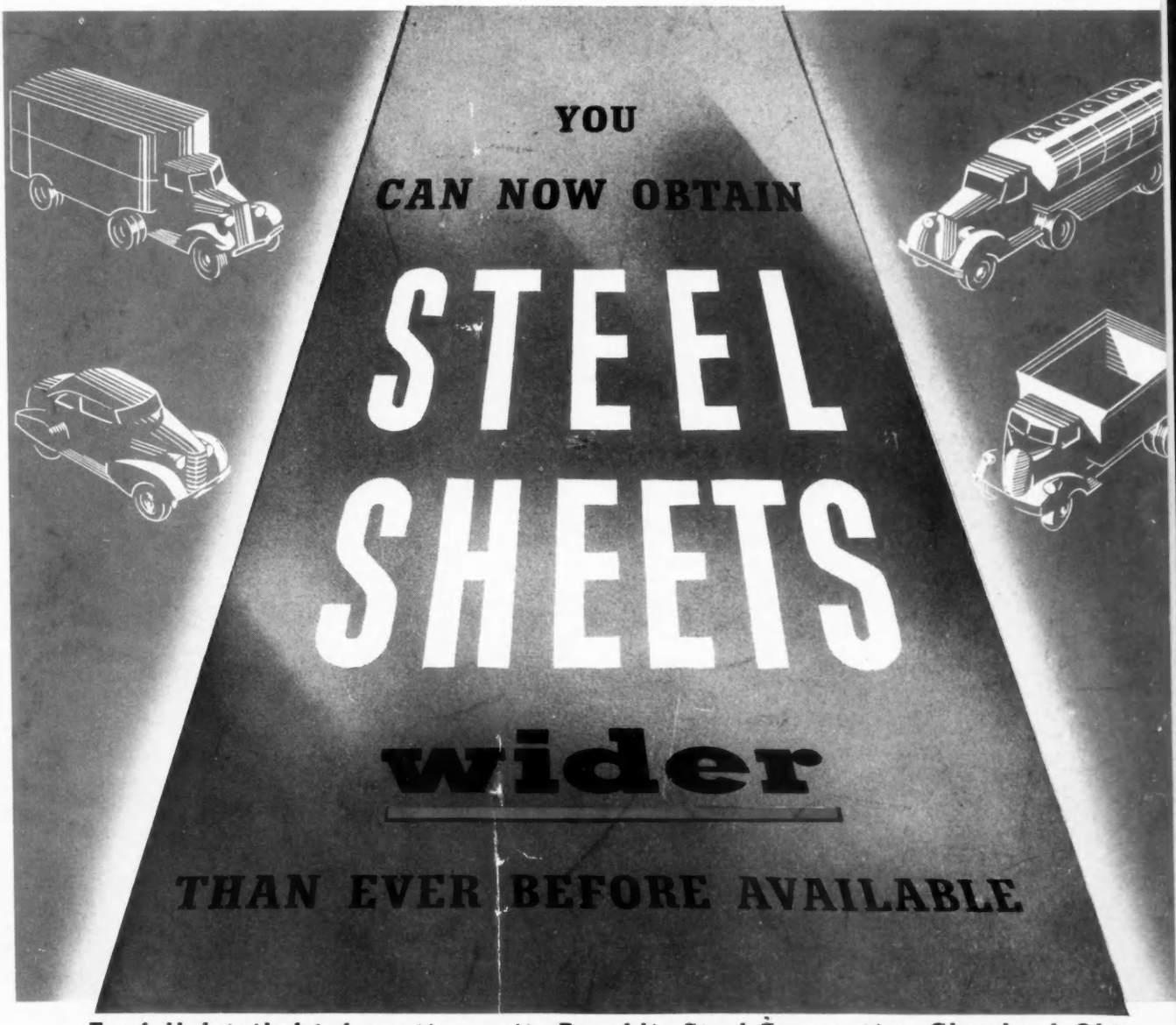
NOVEMBER 19, 1938



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REPUBLIC STEEL

REPUBLIC STEEL

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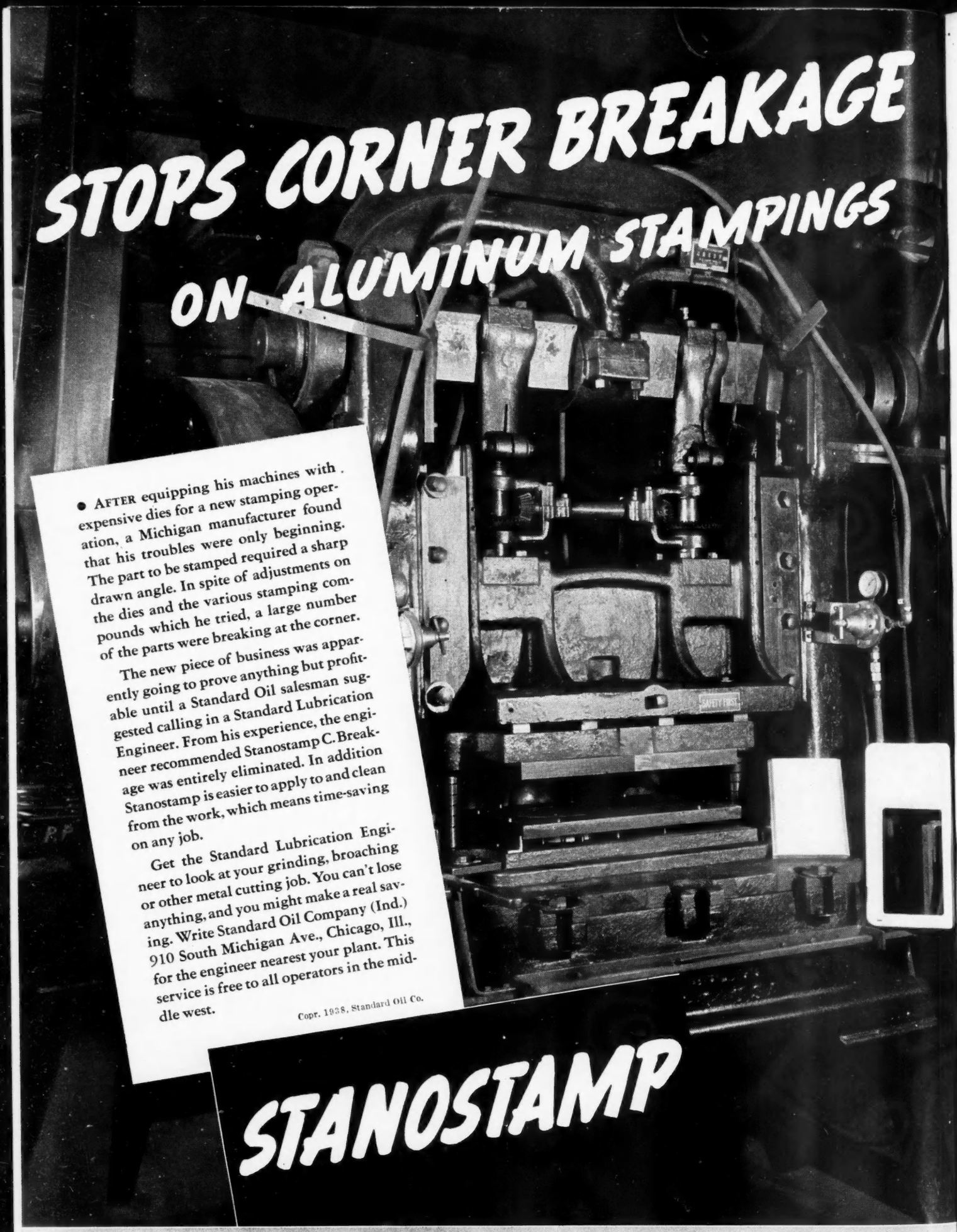

STOPS CORNER BREAKAGE ON ALUMINUM STAMPINGS

• AFTER equipping his machines with expensive dies for a new stamping operation, a Michigan manufacturer found that his troubles were only beginning. The part to be stamped required a sharp drawn angle. In spite of adjustments on the dies and the various stamping compounds which he tried, a large number of the parts were breaking at the corner.

The new piece of business was apparently going to prove anything but profitable until a Standard Oil salesman suggested calling in a Standard Lubrication Engineer. From his experience, the engineer recommended Stanostamp C. Breakage was entirely eliminated. In addition Stanostamp is easier to apply to and clean from the work, which means time-saving on any job.

Get the Standard Lubrication Engineer to look at your grinding, broaching or other metal cutting job. You can't lose anything, and you might make a real saving. Write Standard Oil Company (Ind.) 910 South Michigan Ave., Chicago, Ill., for the engineer nearest your plant. This service is free to all operators in the middle west.

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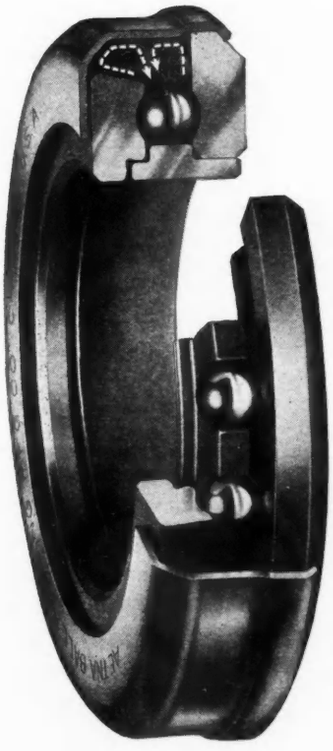
STANOSTAMP

STANDARD OIL COMPANY (INDIANA)

LUBRICATION ENGINEERING — *THE RIGHT LUBRICANT • PROPERLY APPLIED TO REDUCE COSTS*

STANDARD ON MORE THAN 50% OF THE GREAT NEW 1939 MODELS



● Only after exhaustive tests do automotive engineers change standard equipment. Yet, in the four years since Aetna "T" Type Clutch Release Bearings were introduced over 50% of the manufacturers using clutch release bearings have switched *TO* Aetnas, none have since switched *FROM* Aetnas.

There's ample reason for such a marked preference. Aside from being the ultimate in metallurgical and mechanical excellence, Aetna "T" Type Clutch Release Bearings offer new, revolutionary advantages and definitely end all the troubles characteristic of conventional type bearings (see below).

If your cars and trucks are not Aetna-equipped, why not investigate? Laboratory "torture" tests, time and millions of miles of usage under the severest heat, cold and load conditions have proven them worthy of your consideration. AETNA BALL BEARING MANUFACTURING COMPANY, 4608 SCHUBERT AVENUE, CHICAGO, ILLINOIS. Detroit Office: 7310 Woodward Avenue. Cleveland Office: 402 Swetland Bldg.

●

Cut-away view shows Aetna's famous *ONE-PIECE*, "T"-shaped, oil-cushioned bronze ball retainer that assures true alignment—abolishes the noise, wear and tear of eccentric thrust. Arrows show how beveled surfaces force centrifugally thrown lubricant back to vital working parts. Only Aetnas have these features. Only with these features can you be sure of positive, escape-proof, carefree lubrication.

Aetna "T" Type CLUTCH RELEASE BEARINGS

THE "T" TAMES TROUBLE

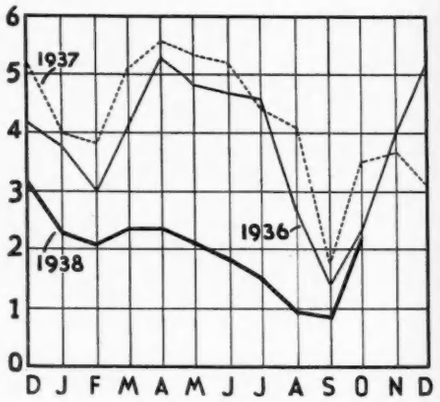
AUTOMOTIVE PRODUCTION*

Passenger Cars and Trucks —U. S. and Canada

Bar charts at the right represent total production to Oct. 31st of year indicated.

Numbers at left of monthly graph below show production in 100,000's.

★From Department of Commerce Report and Automobile Manufacturers' Ass'n.



Ideas in Zinc

It is significant that 10 of the 15 makes of cars in the medium and high priced groups will have zinc alloy die cast radiator grilles in 1939. Automotive engineers have concentrated their efforts on radiator grilles and hood lines, for these are the features which immediately distinguish one car from another. And visitors at the National Automobile Show have given complete approval to the new front end designs.

In the trend toward the elimination of the familiar center radiator grille, front end lines have been expressed with tapered hoods flanked by side mounted zinc alloy die cast grilles faired gracefully into the front end sheet metal aprons.

But there are still a number of cars which have retained the grille in the center position. The 1939 Hudson Country Club "6" front end is typical of the treatment on these cars. Here we find that the main grille is supplemented by low mounted grilles on either side—all three are die cast of zinc alloy.

It has been definitely established that low mounted grilles provide greater efficiency in air cooling, with the result that they will be found on all '39 cars either as the main grilles, supplementary grilles, or both as in the case of Hudson.

Automobile designers have found that the die casting process provides the most flexible means of securing the unusual contours—the accuracy of dimensions—which are demanded in present day grille designs. This is due, in no small part, to the availability of the research developed Zamak alloys, based on Horse Head Special ZINC of 99.99+% purity. The New Jersey Zinc Company, 160 Front Street, New York City. *Idea No. 19*

AUTOMOTIVE INDUSTRIES
The Automobile

Reg. U. S. Pat. Off.
Published Weekly

Volume 79 Number 21

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AUTOMOTIVE INDUSTRIES

Vol. 79, No. 21
November 19, 1938

News of the Industry

SALARY CUTS RESTORED

● Akron rubber and tire manufacturers on Nov. 16 reinstated salary reductions for office workers which were made last April. Between 8000 and 10,000 tire company office employes are benefitted. The cuts were made last April due to sluggish business and the city's labor crisis, and averaged 10 to 20 per cent for most employes.

YELLOW TRUCK DIVIDEND

● The Yellow Truck & Coach Mfg. Co. has declared a quarterly dividend of $1.75 per share on its seven per cent cumulative preferred stock, payable Dec. 23, 1938 to stockholders of record Dec. 16, 1938.

PRIVATE FLYING

● The Cub "coupe," a new airplane intended to meet the requirements of private pilots for a safe and economical craft of low first cost, has reportedly been placed in production by the Piper Aircraft Corp.., of Lock Haven, Pa. Powered with a fifty hp. engine, the "coupe" is said to have a landing speed well below thirty-five m.p.h. and a top speed of ninety m.p.h.

● Private flying operations during the first six months of 1938, according to a Civil Aeronautics Authority survey, showed an encouraging increase in terms of miles flown for each fatal accident, but revealed a slight drop in mileage per passenger fatality due to the comparatively greater number of persons involved in each individual accident.

BEARING MAKERS COOPERATE

● Precision Bearings, Inc., with headquarters and factory located in Los Angeles, Calif., has announced that in conjunction with the Ahlberg Bearing Co. of Chicago, the two firms will act as exclusive distributors of Bower tapered roller bearings in the United States.

These two companies will maintain a nation wide organization for the exclusive servicing of anti-friction bearings.

AUTOMOTIVE INDUSTRIES

Summary of Automotive Production Activity
(Week Ending Nov. 19)

BUSES Producers in this field are plodding along steadily with a manufacturing rate that appears to average somewhat below 50 per cent. While several report slight decreases in activity this week there seems to be a prevailing belief that conditions will begin to improve slowly but steadily within the next few weeks.

TRUCKS Perked up by inquiries and orders beyond expectations at the National Truck Show, officials in this field are voicing the opinion that business will soon take an appreciable upturn.

TRACTORS Many dealers have orders on hand but are unable to make deliveries because the farmers have no money to buy. This is especially true of dairy country where farmers are getting small pay for milk. One large builder is bringing out a new model with rubber tires, electric starter and lights.

AUTOMOBILES The stimulus of shows held this week throughout the country is counted upon for boosting sales well above last year's third quarter. The industry's output of cars and trucks this week is estimated at 93,000.

MARINE ENGINES Factory executives are optimistic about 1939. They are counting upon the widespread interest in motor boating for a part of the upswing, and government and shipping inquiries are numerous.

AIRCRAFT ENGINES Production is running full blast on both private and government orders. Several new research programs are well underway in Eastern plants.

This summary is based on confidential information of current actual production rates from leading producers in each field covered. Staff members in Detroit, Chicago, New York and Philadelphia collect the basic information, in all cases from official factory sources.

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Production

Week's Car and Truck Output Estimated at 93,000

Production executives in the car and truck industry stuck realistically to their jobs during the week ending Nov. 19 to register another increase in output while attention of a major portion of the industry's leaders was still focussed on the national automobile show in New York and on the shows which were running concurrently in a number of other important sales centers.

Preliminary reports covering the first few days of the automobile shows indicated that in practically all instances buying interest was running well ahead of last year even though there were signs that show attendance might not equal the previous year's figures. Demand for new cars, as expressed directly in orders written or by indications of early purchases, has been definitely demonstrated, these reports indicate, while attendance records can be explained by the fact that a majority of the new cars were announced well in advance of the shows.

A mid-week check of production schedules indicated that the industry expected to turn out approximately 93,000 cars and trucks during the current week, the highest total thus far achieved during the new model season. Unless unforeseen developments take place it is expected that production during the balance of the year will run along at approximately the present pace with a slight seasonal drop expected about the first of the year.

With gains over the previous week at Chevrolet, Pontiac and Oldsmobile, General Motors divisions were expected to account for more than 42,000 cars and trucks during the current week. Chrysler divisions were expected to exceed 17,000 and further gains at Ford and Lincoln-Zephyr should bring that producer's total above 18,000.—J. A. L.

News of the Industry

LIBBEY TO PAY DIVIDEND

● Libbey-Owens-Ford Glass Co. has declared a dividend of 50 cents a share payable Dec. 15 to holders of record Nov. 29, bringing 1938 distribution to $1.25 a share.

John D. Biggers, president, announced at the same time that salaries of 563 officials who accepted 10 per cent reductions earlier in the year would be restored Dec. 1 and that checks covering the entire reductions would be presented before Christmas. "Our business has improved more rapidly than seemed possible," said Mr. Biggers, "and as a result the company will make a moderate profit this year.

As of Nov. 10 he reported the company had 7000 employes. George E. Ford, Jr., assistant plant manager at Rossford was named a director to succeed his father who died recently. Milton Knight was promoted to secretary and Frederic F. Robinson was made assistant to the president.

● A net loss of $694,078.83 for the quarter ended Sept. 30 has been reported by the Briggs Mfg. Co. In the same period a year ago the company showed a profit of $1,886,640, or 95 cents per share. For the first nine months of 1938 net profit amounted to $253,370, whereas during the same period last year net profit totaled $7,815,310.

TOWARD SAFETY ON HIGHWAYS

● With the automobile rolling up 10 times the combined mileage of all other forms of transportation on land or sea or air, highway safety is a business concern to the motor car business, said W. J. Cameron of the Ford Motor Co. at the annual luncheon of the Automotive Safety Foundation, held in New York City, Nov. 11. He added, "It is not enough for us to point with pride to the 250,000,000,000 miles the auto makes annually. We must also think of the 50,000,000,000 miles of business that are lost to us through people who are afraid to drive upon highways under all the conditions which they read of in the papers as existing."

● "The motor vehicle accident rate in 1935 was 17.4; in 1936, it was 16.4, and in 1937, it was 15.8. So far this year it is just over 12. That figure doesn't mean much, but when we measure that rate against the present vehicular mileage in the United States, it takes on a real significance. This reduction of approximately one-third in the accident rate means, as against the 1935 rate, a saving of 12,000 lives, a reduction of not less than 350,000 injuries and $350,000,000 in cash loss from accidents." These figures were presented by Paul G. Hoffman, president of the Studebaker Corp. and chairman of the Automotive Safety Foundation as a portion of his address before the fifth annual convention of the American Trucking Association in Detroit.

"IT SEEMS TO ME . . ."

● "It seems to me," says Alfred P. Sloan, Jr., "that the great problem that affects industry is how to establish the relationships between the component parts of industry, by which I mean the workers, both actual and administrative; the capital involved, and the consumers, and the relationship of the group as a whole with government. We must not only establish those relationships, but properly divide the productivity of industry among those component parts so that the maximum productivity and the greatest benefit to all are assured." Mr. Sloan made these remarks when introducing C. F. Kettering at a luncheon held in New York, Nov. 14.

● C. F. Kettering, speaking on the subject, "The Motorcar in the World of Tomorrow," at G. M.'s luncheon, held in New York on Nov. 14, commented, "We have today a very unusual condition in this country where we have got an excess of materials, an excess of money, and an excess of men. Now, all that can mean to a primitive mind like mine is that we haven't got any projects to work on. That is all. It means that we are technologically behind and not technologically ahead. If we could get this idea that we know very much about everything out of our minds, and that the whole thing is ahead of us, then I think we would have a shortage of labor in a short time."

GOODYEAR EMPLOYES PETITION

● The Akron Goodyear Employes' Association on Nov. 12 filed a petition asking the regional office of the National Labor Relations Board at Cleveland to certify it as sole bargaining agency for factory employes of the Goodyear Tire & Rubber Co.

As an alternative to certification, Charles Smoyer, attorney for the association, asked the NLRB to conduct an election to determine bargaining rights, now held by Goodyear local, No. 2, United Rubber Workers of America.

Already pending before the board are charges by the Goodyear local that the association is company dominated and hence illegal under the National Labor Relations Act.

Filed last April, the charges have not yet been considered by the board. An investigation by the board is expected to precede a possible call for a new election.

"We are not going to be sidetracked by any of this company union talk," said Smoyer, concerning the union's charges. He declared that the petitions presented to the board contain between 3700 and 3800 names—more than a majority of the factory employes at Goodyear.

● Consumption of crude rubber by manufacturers in the United States during the month of October aggregated 40,333 tons, an increase over the 37,823 long tons consumed in September of 6.6 per cent and 4.1 per cent above October a year ago, according to estimates made by the Rubber Manufacturers Association.

The association reports gross imports of crude rubber for October at 34,496 long tons, a decrease of 7.7 per cent under the September figure of 37,374 long tons and 34.3 per cent under the 52,508 long tons imported in October, 1937.

Domestic stocks of crude rubber on hand Oct. 31 totaling 269,937 long tons are slightly below Sept. 30 stocks of 276,586 long tons, well above the 200,025 long tons on hand Oct. 31, 1937.

Crude rubber afloat to United States' ports as of Oct. 31 is estimated to be 51,062 long tons which compares with 48,927 long tons afloat on Sept. 30 and 80,653 long tons afloat on Oct. 31 a year ago. October reclaimed rubber consumption is estimated at 11,803 long tons, production 13,558 long tons, stocks on hand Oct. 31, 19,090 long tons.

"Educational Orders"

War Department May Expand Program for Industrial Mobilization

The War Department's $10,000,000 educational order program was well under way this week when officials completed the job of sending out circular proposals on five items called for under the first year's schedule contemplating the expenditure of $2,000,000. At the same time, AUTOMOTIVE INDUSTRIES was told by Assistant Secretary of War Louis Johnson, key man in the Government's industrial mobilization program, that an expanded educational order program would be recommended to the next Congress. The extent of the proposed expansion was not given but there were indications, based on experience developed under the current undertaking plus the trend toward greater rearmament, that it would be substantial.

Thus far the program, designed to familiarize industrial firms with the Government's wartime requirements in an effort to speed up industrial preparedness, has been handled largely from Washington but after orders are placed, representatives from the Ordnance Division's 14 branches will be placed in the field to contact firms receiving contracts. The system is described by officials as a new departure in Government efforts to fill the gap in the industrial mobilization picture as envisaged under the National Defense Act of 1920.

Since that time, Army officers have inspected more than 20,000 industrial plants, 10,000 have been earmarked for war production and plant managers have been advised of specific assignments. The Army also has solicited metal-working plants, seeking assistance in the design of technical munitions in a move aimed at standardizing component parts in the interest of mass production. In addition, thousands of other plants, whose jobs will be to fill in during an emergency, have been catalogued and will be trained along specific lines with the rest to a much greater extent than ever attempted before.

War Department officials from time to time have expressed concern over what was regarded as the unfortunate tendency among military designers to develop complicated machines not readily adaptable for mass production. In the long run, they believe that what the Army should adopt is what private industry can make best in the minimum of time.

The primary obstacle in the move to put the Army on wheels is lack

of standardization of equipment, officials say. Out of 28 makes and models of passenger cars and 143 makes and models of trucks, the Army is attempting to secure standardization of models to correct what it regards as an absurd situation so far as its own requirements are concerned. They have expressed a determination to reduce non-essential types to a minimum in order to open the way for manufacture on a mass-production basis to fill its needs in times of emergency.

Tanks and combat cars, it is pointed out, offer a slightly different problem because the manufactured product requires the coordinated efforts of specialized groups making armor plate, engines, transmissions, machine guns, ball and roller bearings, clutches, springs, electric starters, generators and other parts. Most of these are non-commercial items, adding to the problem, and thousands of special tools and jigs and fixtures are required to produce tanks in quantity. Illustrative of the ramifications of the manufacture of tanks and combat cars, the War Department says the modern light tank consists of 22,000 parts and requires 3300 separate engineering drawings —far too many to be conducive to mass production. The Department looks to the automobile industry to answer many of the manufacturing problems involved.

Secretary Johnson has classified the industrial mobilization program under these categories: (1) Educational orders; (2) adequate power for industrial use; (3) the training of airplane mechanics to correct a shortage; and (4) accumulating stock piles of strategic materials and mapping the railroad's part in a mobilization plan.

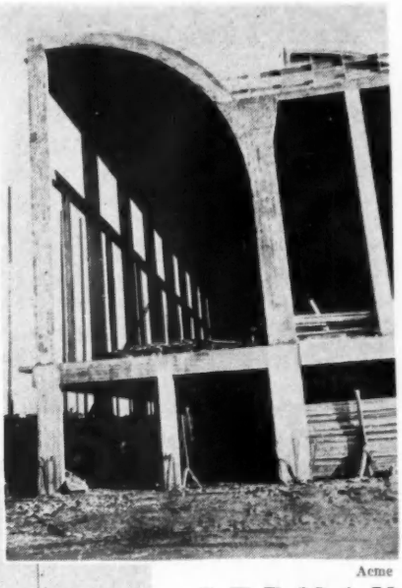
The first is considered well under way. The second, involving so far commitments from leading utility companies to embark on an expansion program involving capital expenditures of $2,000,000,000 during the next two years, has been tentatively agreed upon. Details of the third plan have not been disclosed. The Department's program for accumulating strategic materials is represented by the pending Thomas bill, behind which it has thrown its support.

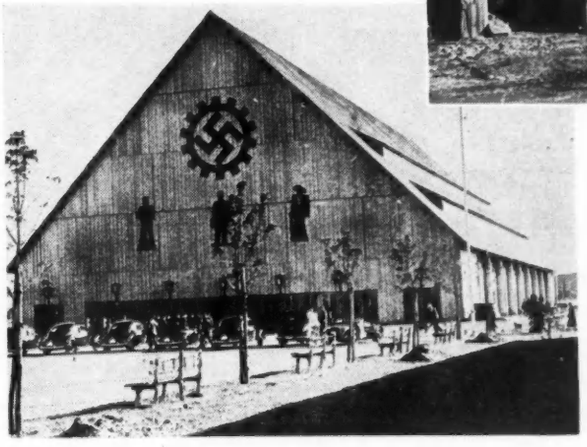
Before the railroad mobilization plan can be developed further, officials are waiting for a railroad rehabilitation move by Congress.

Working closely with Johnson in the industrial mobilization program is Charles T. Harris, Jr., assistant to the Chief of Ordnance, who has been promoted to Brigadier General; and Col. Harry K. Rutherford, director of the Planning Branch. Tied into the program with the Planning Branch is the Navy Munitions Board, headed by Johnson, representing the War Department, and Assistant Secretary of the Navy Edison.

Edward L. Grimm

Edward L. Grimm, 59, retired president of the Peerless Marine Motor Corp. of Buffalo, died recently at Daytona Beach, Fla. He was widely known as a builder of marine engines and the owner of the racing hydroplane, Miss Peerless.





Acme

GERMAN workers engaged in building the factory at Hohenstein-Ernstthal where the Reich's low-priced cars will be built, live in a huge camp near the site. Pictured at the left is the entertainment hall. The view above shows the concrete skeleton of what is to be the mechanical shop of the new factory.

GM to Try Wage Stabilization Plan

Monetary Advance to Be Made Available to Hourly Wage Employes in Slack Periods; Repayable to Corporation Only with Work

Two wage stabilization plans for eligible hourly wage employes of General Motors Corp. having a service record of two years or more were announced early this week by Alfred P. Sloan, Jr. The plans will be known as the General Motors Income Security Plan, and the General Motors Lay-Off Benefit Plan.

"These benefit plans," said Mr. Sloan, "are the culmination of extensive experiments the corporation has been conducting in several of its plants for a number of years in an effort to develop ways and means whereby greater stability might be provided for as large a group of its factory employes as possible, and for as large a part of the year as practical. These experiments have now reached a point which justify making the benefits available for eligible employes throughout the entire corporation and its wholly owned subsidiaries within the United States."

All hourly wage employes having five or more years' service and who are in the employ of the corporation any time during December 1938, will benefit by the Income Security Plan. It assures every eligible employe an income of not less than 60 per cent of his standard weekly earnings for each week during the year in which the plan is in operation. "Standard weekly earnings" are defined as the pay for 40 hours at the latest average hourly earned rate.

The weekly guaranteed income will consist of the following: 1, Pay for the amount of work performed for the corporation; 2, pay for any other regular employment; 3, unemployment compensation; and, 4, an advance to be made by the corporation to insure a minimum weekly income of at least 60 per cent of standard. Mr. Sloan emphasized that the advance by the corporation is made on the request of the employe and is payable only in terms of opportunity to work. "An advance," he explained, "is not a liability in the ordinary sense, is payable only through work and bears no interest. When the weekly earnings exceed 60 per cent of standard, the employe will repay advances at the rate of one-half the amount by which such earnings ex-

(Turn to page 664, please)

News of the Industry

WHAT ARE THEY DOING?

DUANE E. STEINLE, for the past year connected with the New Britain-Gridley Machine division of the New Britain Machine Co. at New Britain, Conn., recently moved to Detroit where he will be connected with the sales enginering staff in that city.

ROLLAND C. ALLEN, of Cleveland, Ohio, executive vice-presdient of Oglebay, Norton & Co., has become a member of the board of trustees of the Battelle Memorial Institute.

W. J. DAILY, formerly assistant manager of lubricating sales, Pennzoil Co., has joined the Wolverine-Empire Refining Co. at Oil City as sales manager.

FRANK L. FOOTE, formerly advertising manager of the Hastings Mfg. Co., Hastings, Mich., has joined Maremont Automotive Products, Chicago, as sales promotion manager.

ADVERTISING NEWS NOTES

● Chrysler Corp. has started a large institutional advertising campaign, based on the theme of "functional design." J. Stirling Getchell is the agency.

● Maurice F. Hanson, for five years an account executive with Benton & Bowles, New York, has joined J. Walter Thompson, Chicago office.

● L. W. Schaffer has been appointed sales promotion manager of B. F. Goodrich Co., in the Milwaukee district.

● Kenneth Dawkins has been appointed advertising manager of the National Battery Co.

● Thurman Arnold, assistant attorney general of the United States, has given advertising men something to think about. In discussing the consent decrees which ended the anti-trust actions against Ford and Chrysler in South Bend, in connection with their finance affiliates, Mr. Arnold, with the approval of Attorney General Cummings, flayed advertising as a breeder of the "evils of monopoly." He condemned the use of large advertising appropriations when competitors "do not have the resources to spend equally large sums," and decried advertising copy which stressed the peculiar qualities of common goods under particular trade names. He pointed out that this would force competitors to either go out of business or raise comparable sums for advertising to build up their own trade names. He predicted that the consent decrees "may become most important precedents in preventing the misuse of advertising power in other fields." Advertising were startled at the pronouncement, some fearful of the widespread implications.

GOVERNMENT PURCHASES

● Government purchases of transportation equipment, as reported by the Public Contracts Board for the week ended Nov. 12, totaled $677,648. The awards were: For trucks—International Harvester Co., Inc., Ft. Wayne, Ind., and Trailer Co. of America, Cincinnati, Ohio, an estimated $42,050; General Motors Corp. (Chev. Div.), Detroit, Mich., Janesville, Wisc., and Leeds, Mo., $90,013; Fargo Motor Corp., Detroit, Mich., $22,900; for engines and parts—Wright Aeronautical Corp., Paterson, N. J., $222,755; aircraft sights—Keuffel & Esser Co., Hoboken, N. J., $166,950; airplane brake parts—Bendix Products Div. of Bendix Aviation Corp., South Bend, Ind., $10,632; aircraft engine parts—United Aircraft Corp., Pratt & Whitney Aircraft Div., E. Hartford, Conn., $49,063; cable terminals—Macwhyte Co., Kenosha, Wisc., $10,083; tank cars—American Car & Foundry Co., Milton, Pa., $63,200.

Miscellaneous awards announced during the same period: For tractors—Caterpillar Tractor Co., Peoria, Ill., $16,596; tires and tubes—The Falls Rubber Co., Findlay, Ohio, an indefinite amount; Hicks Rubber Co., Waco, Texas, an indefinite amount. Purchases to be made if, when and where needed, source of supply unknown.

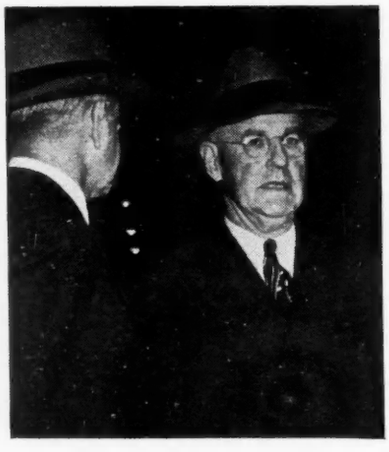
ACROSS THE BORDERS

● The Mexican Government will probably soon place a large order in Canada for fast fighting planes. First Lieutenant Roberto de la Barreda, of the engineering staff of the Mexican Air Force, was in Montreal recently and stated that on his return to Mexico he would report both on this new plane and on the Grumman two-seat fighter. Referring to the Grumman he added, "We will either buy them in Canada or manufacture them in a branch plant in Mexico."

● The Canadian Car & Foundry Co., Ltd., Montreal, will take over the operation of a Government-owned airplane factory in Mexico and run it on a managerial and profit-sharing basis after a conference between Lieutenant Roberto de la Barreda of Mexico's air force and Leonard A. Peto, vice-president of the Canadian Car & Foundry Co., Ltd.

"We do not plan to invest a cent," said Mr. Peto. "We have been negotiating for some time with the Mexican Government for an agreement and I understand that these proceedings have now reached a point whereby all that remains to be settled are the actual financial arrangements."

● Canadian Vickers, Ltd., Montreal, has just completed the largest airplane ever built in Canada, an 8½-ton "Stranraer" flying boat. It is the first of several of its type being made for the Department of National Defence, Ottawa, Ont. The plane has a wing spread of 85 ft., is 56 ft. long, 19 ft. high. It is powered by two Bristol Pegasus X engines.



EXECUTIVES heading the activities of the major automobile producers each year flee as one man from Detroit and other major manufacturing centers of the industry to attend the National Automobile Show in New York where they "stop, look and listen"—and, this year, smiled optimistically. Here are Alfred Reeves, vice-president and general manager of the Automobile Manufacturers Association (side to camera) and Alvan Macauley, AMA president and president of the Packard Motor Car Co.

Judge Slick Approves

Final Settlement at South Bend Hinges on Outcome of GM Case

Federal Judge Thomas W. Slick, South Bend, has given a provisional approval to the consent decrees of Chrysler Corporation and Ford Motor Company. The final settlement hinges on the outcome of the General Motors' case.

The two companies agree to abandon certain alleged coercive practices in connection with automobile financing. The Government obtained indictments against the three automobile companies last May charging that the concerns forced automobile dealers to finance cars through firms affiliated with the automobile manufacturers. General Motors has filed a demurrer to the indictment against it and arguments will be heard by Judge Slick in court in Hammond.

K. T. Keller, president of the Chrysler Corp., issued the following statement in connection with signing of the consent decree in the automobile financing charges involving his corporation, Ford and General Motors.

"In the negotiations with the Department of Justice looking toward a consent decree relating to automobile financing, the position taken by Chrysler Corp. and embodied in the decree may be briefly stated as follows:

"Chrysler Corp. has been willing to enter into an agreement with the department provided first—that the opportunity to get its products to

ENGINEERS in the automotive field put aside slide rules and blueprints at least once a year when they converge from all points of the compass on the New York Show to examine the products of the ingenuity of their professional competitors. Here are John A. C. Warner, general manager of the Society of Automotive Engineers, and Ralph R. Teetor, in charge of engineering for the Perfect Circle Co.

300 MEN WHO GUIDE the affairs of industrial and business organizations whose products and services contribute to the maintenance and manufacture of the automobile were entertained at a luncheon given by GM's chairman, Alfred P. Sloan, Jr., in New York, Nov. 14. Charles F. Kettering, vice-president of General Motors in charge of research, spoke on "The Motorcar in the World of Tomorrow." Above, left to right standing, are Richard C. Paterson, Jr., assistant secretary of commerce; Mr. Sloan, Charles M. Schwab, chairman, Bethlehem Steel Corp.; seated, Mr. Kettering, Gerard Swope, president, General Electric Co., and Alvan Macauley, president, Packard Motor Car Co.

SAE Hears Prentis

Armstrong Cork President Featured Speaker at Society's Dinner

Human freedom rests upon the tripod of free enterprise, representative democracy, and religious freedom, H. W. Prentis, Jr., president, Armstrong Cork Co., Lancaster, Pa., told more than 1200 members and guests of the Society of Automotive Engineers at the Society's annual dinner held Nov. 14 in New York.

"Destroy any one of the three legs of this tripod and the whole structure of freedom will crash," Mr. Prentis warned the designing and production executives and engineers of the automotive industry.

As chairman of the Committee on Industrial Practices of the National Association of Manufacturers, Mr. Prentis was active in formulating the Platform for American Industry, a code of ethics for business executives.

"This is the first time that any national group of manufacturers has sat down together in any country and endeavored to reduce to simple, understandable form the principles that should guide business men who sincerely desire to conduct their enterprises on a high ethical plane.

"The Committee has no illusions that a millennium in business can thus be brought into being over night. But it knows that business practices of a generation ago are taboo today; it knows that any sound reform in personal or economic morals must spring primarily from the minds and hearts of men," he said.

the public at low prices is not restricted, and second—that competitive equality as between it and its competitors is not impaired.

"Chrysler Corp. from its relatively small beginning has attained its present position in the industry by willingly engaging in competition in a highly competitive business, in which at least several large companies were well entrenched. From its beginning it has asked only for the opportunity to compete in offering automobiles to the public and in attracting to itself dealers through whom to do so. By competing as it has done, its purposes and methods have always been to keep itself on a competitive equality with its competitors and to do all in its power to enable its dealers to compete on an equal basis with the dealers of other manufacturers.

"Our understanding is that the consent decree which has been agreed upon by the attorneys for Chrysler Corp. and the department of justice preserves for the corporation this competitive equality.

"The collection practices of wage assignments, salary and wage garnishments, deficiency judgments, etc., mentioned in the consent decree have to do with finance companies and have never been practiced by Chrysler Corp.

"Chrysler Corp. at the present time has no contractual relations with any finance company, and no financial interest in any finance company. While the policy of Chrysler Corp. is not to restrict its dealers in their finance business to any one finance company, it does strongly urge its dealers to afford the public the lowest possible rates. It has in the past, and will continue in the future, to afford its dealers all the assistance to that end for which they may properly look to it."

Estimated Dealer Stocks of New Passenger Cars

1937	January	February	March	April	May	June
Production—U. S. Domestic Market†	285,749	276,469	376,245	410,592	400,415	387,121
Retail Sales—U. S.‡	249,715	216,770	409,205	387,887	407,610	365,160
Change in Inventory	+36,034	+59,699	−32,960	+22,705	−7,195	+21,961
Inventory, first of month	248,200	284,234	343,933	310,973	333,678	326,483
1937 (continued)	**July**	**August**	**September**	**October**	**November**	**December**
Production—U. S. Domestic Market	341,189	299,496	110,122	273,753	269,580	212,655
Retail Sales—U. S.	347,120	310,312	192,967	212,651	212,389	171,643
Change in Inventory	−5,931	−10,816	−82,845	+61,102	+57,191	+41,012
Inventory, first of month	348,444	342,513	331,697	248,852	309,954	367,145
1938	**January**	**February**	**March**	**April**	**May**	**June**
Production—U. S. Domestic Market	130,273	119,896	153,316	160,028	140,239	123,333
Retail Sales—U. S.	126,442	120,348	188,325	193,392	187,306	155,811
Change in Inventory	+3,831	−452	−35,009	−33,364	−47,067	−32,478
Inventory, first of month	408,157	411,988	411,536	376,527	343,163	296,096
1938 (continued)	**July**	**August**	**September**	**October**	**November**	**December**
Production—U. S. Domestic Market	96,975	53,955	60,177			
Retail Sales—U. S.	153,426	123,711	90,629			
Change in Inventory	−56,451	−69,756	−30,452			
Inventory, first of month	263,618	207,167	137,411	106,959		

†—U. S. Census Bureau. ‡—Automobile Manufacturers Association.

News of the Industry

NEW HORIZONS FOR SILVER

• A Bureau of Standards research project, sponsored by a group of silver producers, has discovered that the metal has possibilities as an alloying element for increasing the strength or otherwise improving certain engineering alloys.

The Bureau says that one of the most promising developments is the use of small quantities of silver added to a magnesium alloy which may be suitable for castings and other parts for aircraft construction. In experimenting with alloys of silver and iron, it has been found that very small quantities of silver affect the rimming tendency in low-carbon stock, apparently reducing the tendency toward porosity in the ingot. Further study is being directed in this connection, however, to make certain that the addition of silver, and not some other cause, produced what was regarded as rather unusual results.

Whether the small additions of silver to brass, bronze and other alloys would justify the somewhat higher cost is a problem on which Bureau experts are continuing to work.

• Interest in the research work carried on by the Institution of Automobile Engineers in England is growing, according to the seventh annual report of the Institution, recently issued, which covers the year that ended June 30 last. The number of members supporting the research work rose from 258 to 281 in the course of the year, and the expenditure on research rose from £15,900 to £17,000. The staff of the research department was increased and considerable progress was made during the year. Work is being continued on the following research projects: Cylinder wear, wear and cracking of bearings, brake squeak, gear durability, cold-starting of gasoline engines, oil consumption, materials for deep drawing, engine friction at high speeds, wheel impact, silencing of motorcycles, body-panel drumming, heat transfer from brake drums to wheel rims, engine-bearing temperatures, oxidation and gumming of lubricating oils, fatigue failure of crankshafts. The report gives a summary of the work which has been done under the various headings up to the end of the year covered.

AVIATION ACTIVITIES

• With the second of its No. 314 Pan-American Clipper type planes near completion and four others in process, Boeing Aircraft Co., having completed its own tests on the first of the 74 passenger ocean air liners, has turned the ship over to the Civil Aeronautics Authority officers for Government tests. These will last several weeks and furnish data for official files and license approval.

In the Boeing tests, extensive report on which has now been released for the first time, the plane went through 80 take-offs and landings, taxied 450 miles and was flown about 5000 miles. The program included 32 distinct tests each composed of many individual items and representing one day's work each. Tests were made under the direction of Edmund T. Allen as test pilot and R. J. Minshall, vice-president of engineering of Boeing.

• Civil aviation in the British Empire made notable progress in 1937, according to the Civil Aviation Statistical and Technical Review recently issued by H.M. Stationery Office. Imperial Airways, together with its associated companies on the Empire routes flew more than 5,700,000 miles and carried nearly 65,000 passengers. The total passenger miles increased from approximately 27,900,000 to 35,400,000, the mail ton-miles from 1,794,000 to 3,637,000 and the total ton-miles from 4,869,000 to 7,549,000. There were 147 machines of United Kingdom manufacture employed by the regular air transport companies in the United Kingdom and 292 in the Empire, while 78 such aircraft were in use by 19 foreign operating companies.

In flights between England and the Continent no fewer than 159,125 passengers were carried, a number 10 per cent greater than in 1936. The number of flights increased 8 per cent. The Dutch increased their number of flights 34 per cent, the French 25 per cent, the Germans 51 per cent, and the Swiss 13 per cent. Of passengers in foreign-owned aircraft the French with 24 per cent had the greatest increase.

• With its current backlog of unfilled orders at an all time high of $375,000, Ryan Aeronautical Co., San Diego, Calif., is well ahead of scheduled deliveries under current contracts, according to Claude Ryan, president. These include the two largest orders ever let for exhaust manifold equipment, which alone represent about $200,000 in value.

Work in the company's contract manufacturing division is being speeded in anticipation of additional contracts. It is reported that increased volume and the large amount of business in prospect for its specialty aircraft products and military training airplanes for foreign governments, will result in greater production expansion at the San Diego factory.

• Officials of Lockheed Aircraft Corp. confirmed receipt of an order from the Australian air board for 50 reconnaissance bombing planes. Confirmation was received from Canberra, seat of the Australian government.

Amount of the order is about $4,500,000, not including spare parts or extra equipment. The planes will be powered by American-made Pratt-Whitney twin-row Wasp engines of latest design and high horse-power. The entire fleet is to be delivered during 1939.

• In the first 10 months of 1938, Los Angeles County aircraft manufacturers built $43,300,000 worth of planes, breaking by 54 per cent the record set in 1937.

This was shown by a report of the Chamber of Commerce Aviation Committee, which also revealed sales increased from $16,500,000 in 1936 to $27,500,000 last year.

• The old 4½ ft. wind tunnel of the National Bureau of Standards has been modernized and now provides a maximum air speed of 120 m.p.h., a 50 per cent increase over that of the old tunnel built in 1917. The improved performance is obtained by returning the air through a closed duct by which the energy of the air stream is conserved. The tunnel is used primarily for fundamental researches on the flow of air, conducted in cooperation and with the financial support of the National Advisory Committee for Aeronautics.

STREAMLINING—"A FARCE"

• "Streamlining is a farce," said R. S. McLaughlin, president of General Motors of Canada, Ltd., Oshawa, Ont., at a recent preview of 1939 cars in Canada. He added, "We in General Motors are getting back to carriage lines—something beautiful, graceful and at the same time something practical. The beetle sterns that streamlining brought about don't belong on cars."

Wage Stabilization

(Continued from page 661)

ceed 60 per cent of standard. Should any employe die, his unpaid advances will be cancelled."

Those employes who do not come within the Income Security Plan and who have a service record of two years or more and who worked any time after Dec. 1 of the previous year will benefit by the Lay-Off Benefit Plan. Under this plan, the eligible employes will be entitled to receive weekly 40 per cent of their standard earnings under the same general conditions as apply to the Income Security Plan. An exception is that in the second plan the total advance made by the corporation is limited to an amount equivalent to 72 hours' earnings at the employe's latest average hourly earned rate. Amounts so advanced will be repaid by the employe, but only in work performed, under the same conditions as apply to the former plan.

"Particular attention," said Mr. Sloan, "is called to the fact that the corporation is not guaranteeing work for which there is no need. However, using the resources of the corporation as an income stabilizing factor, giving the largest group of employes possible a definite assurance of a substantial minimum weekly income for a definite period is, according to my beliefs, sound and highly desirable. I am gratified that our experiments indicate that it is possible for us to make this further progress toward the objective of providing greater economic security for an important part of our organization.

"It is indicated by our studies that under these plans the advances to the employes benefiting in subnormal periods of activity which occur in the automotive industry year will involve a substantial outlay. While the corporation may sustain a considerable loss, I believe that the greater security provided under the plans, and the better relations that such cooperation will promote between the corporation and the employes benefited, will justify the costs involved.

"Naturally, the plans must be considered more or less experimental. Circumstances may arise that are impossible to foresee. The purpose is, however, to make a start at this time and to develop through evolution such modifications as experience may dictate from year to year. There are included the usual provisions allowing for suspension of the plans in case of fire, floods, wars, riots, strikes or other circumstances beyond the control of the corporation.

Acme

TELEVISION PREVIEW of the National Automobile Show was held at Rockefeller Plaza in New York City on Nov. 10. The 1939 cars, driven before the inconoscope television camera, were viewed on the fifty-fourth floor of the NBC building by dealers and manufacturers.

Automotive Metal Markets

Wire Mills Benefiting by Large Tonnages Placed by Automobile Plants and Good-Sized Orders from Screw and Bolt Manufacturers

A relatively small volume of business for flat rolled steel products is reported to have been booked by finishing mills at the higher levels that were chalked up when the recent price war was called off, but backlogs are preponderantly made up of orders carrying the lower prices that prevailed early in October. Some producers, who sought to restrict commitments at lower prices to early deliveries, found that they had lost business to competitors. Even those who emphasize the inadequacy of profit margins on current billings, sing the praises of restored volume of demand, resulting almost entirely from the upswing in the purchases of automobile manufacturers and parts makers. In the Detroit district the rate of ingot output has risen to 80 per cent of capacity.

The American Iron & Steel Institute's figure for this week's activity in the entire country is 62.6 per cent, a gain of 13 per cent over a month ago and the highest since the middle of October, 1937. Steel production at the present pace means an output of 42,000,000 tons a year, twice what it was during the first half of the year.

Finished steel output is reported by the Iron & Steel Institute to have trailed more than ordinarily behind ingot output, but already some of the Middle West finishing mills that cater chiefly to automotive consumers, find it difficult to make shipments as promptly as buyers would like to have them. This indicates that little time is lost between the ingot stage of steel intended for automotive consumption and its conversion into finished sheets and strip steel, while demand from most other industries still awaits revival. Perhaps nothing illustrates the dominant position of automotive demand in the steel market quite so vividly as the important part it plays at this time in the consumption of wire and wire products. Not only are automobile manufacturers taking considerable tonnages, but wire mills also have good-sized orders from screw and bolt makers for the filling of automotive orders. While tin plate has no automotive uses, a reduction of $5 a ton in the price of that commodity attracted considerable attention because, in the light of this mark-down, upward changes in the steel market generally for first quarter 1939 appear highly improbable.

Prices for secondary aluminum have been advanced. No. 12 alloy No. 2 has been raised ¼ and ½ cents to 14¼ and 14½ cents. Better demand from automotive consumers for piston metal is noted.

Breaks and rallies in the Sterling exchange market exerted more influence on the price movement of tin than the metal's own position in London and Singapore. The week's opening price for spot Straits was 46.70 cents; on Tuesday the market was quiet with spot Straits quoted at 46½ cents. The international buffer pool, which is to consist to 10,000 tons, is reported to have reached 5000 tons.

Copper producers are booking little business at their price for electrolytic, which remains unchanged at 11¼ cents, but in the "outside" market some business was done at 11.05 cents.—W. C. H.

Foreign Factory Workers Want Peace

GM's Knudsen Says That Men in European Plants Realized in Recent Situation "That War Would Settle No Arguments"

In spite of unbelieveable propaganda that is rife in European countries, the factory worker is beginning to doubt the value of national armaments and is decidedly against fighting in anybody's war, William S. Knudsen, president, General Motors Corp., told several hundred visitors from abroad who attended the International Dinner of the Automobile Manufacturers Association held, Nov. 15, in New York.

Mr. Knudsen, Robert C. Graham, chairman of the A.M.A. export committee, and Richard C. Patterson, Jr., assistant Secretary of Commerce, decried the attempted policies of isolation adopted by the totalitarian countries.

"It's more agreeable — and more profitable—to talk business than to discuss war and rumors of war," Mr. Knudsen said, reporting his observations in Scandinavian and Central European countries and in Great Britain.

"No one today wants to fight, because modern warfare has taken away the chance for anyone to be a hero. The world is afraid of the airplane, but history has shown that every new fighting machine will bring about a machine of defense.

"British factory workers were stirred to a high state of hysteria, during the recent war threat, but everyone realized that war would

(Turn to page 668, please)

News of the Industry

MONUMENT TO GOODYEAR

● A monument to the memory of Charles Goodyear — Yankee inventor who discovered the process of rubber vulcanization in his New England home in 1839, will be presented to the city of Akron by the Goodyear Tire & Rubber Company which was named for him. Walter Russell, internationally famous sculptor, now is working in New York on the statue. It will be completed and erected opposite the Akron Municipal Building, February 20—the 100th anniversary of Goodyear's discovery.

IN TURKEY AND BELGIUM

● Out of 2300 automobiles sold in Turkey during the first nine months of 1938 approximately 2104 were of American manufacture, the Department of Commerce reports.

During that period approximately 672 passenger cars of American manufacture and 97 of European manufacture were sold in Turkey. Sales of commercial vehicles amounted to 1531 units of which 1432 were of American manufacture.

The report attributed an increase in the sale of German cars and commercial vehicles to the unwillingness of American car manufacturers to add further to their blocked balance in Turkey. The demand for cars continued brisk and despite the increased sale of foreign cars the belief was expressed that these will decline when American cars are again more readily available.

The salaries of all employes who were receiving $300 a month or less on March 31 last are to be restored to the level prevailing at that time.

● A review of the Belgian automotive market for the third quarter of 1938 received by the Commerce Department reveals that sales stand at 60 per cent American and 40 per cent European, as contrasted with the same period in 1937 when the ratio was 68 to 32 per cent.

Passenger car sales as a whole continued over most of the third quarter at a reduced but relatively satisfactory level except toward the end of September when sales were relatively stagnant.

In the taxicab field, which is still dominated by cars of European manufacture, there were developments favorable to the American industry. The report said that one importer of a light American unit recently ordered 50 more and that among the private taxi firms there is "a strong and growing appreciation of American vehicles." While American units cost more to purchase and operate than most European vehicles used for taxi purpose, the sturdiness of the American vehicle and especially its riding qualities are becoming more appreciated, the report said.

PUBLICATIONS AVAILABLE

The Buda Co., Harvey, Ill., has prepared a new bulletin describing the Buda-Hubron **earth drill.***

The E. F. Houghton & Co. line of **ball and roller bearing greases** is subject of a pamphlet recently brought out by this company.

The Hisey-Wolf Machine Co. announces bulletin No. 54 describing its "Hisey" economy **grinders.***

A booklet by the Lincoln Electric Co. gives procedures for producing all types of **welds in mild steel, for welding all metals used to any extent industrially and for applying surfacing metal.***

"The Coming Change in Federal Price Policy" is the title of a booklet-editorial published by the Farrel-Birmingham Co., Inc., Ansonia, Conn. It was written by Allen W. Rucker in collaboration with N. W. Pickering, president of the company.

* Obtainable from editorial department, AUTOMOTIVE INDUSTRIES. Address Chestnut and 56th Sts., Philadelphia.

40 Years Ago

● Electric charging posts will soon be set up (in Chicago) in large numbers. A driver can then steer his electric buggy up to a post in front of the city hall, any of the office blocks or big stores, and leave it feeding while he goes off about his affairs. One of the advantages of the arrangement will be that by taking out a little pin from the machinery and putting it in his pocket, the owner secures his vehicle as firmly as if it were padlocked. It is proposed that the charge for electricity at the stations will be 50 cents for three hp., for three hours, which would be about six cents an hour for a hp. The vehicles can be charged at an electric lamp, but the price is then 15 cents instead of six cents.

From *The Horseless Age*, November, 1898.

THE NEXT MACHINE TOOL SHOW

● Because 23,755 persons came to see machines, tools, and production equipment shown by 162 exhibitors at the 1938 Machine Tool and Progress Exhibition in Detroit, the American Society of Tool Engineers has decided for its 1939 show to triple total floor space, extend the duration of the exhibition from four to six days, and arrange for 50,000 visitors. A preview and reception are scheduled for March 13. Officially, the show will open March 14, close March 18. Frank Shuler, master mechanic, Chrysler Corp. and former president of the A.S.T.E., has been appointed chairman of the committee in charge of the show which will be held simultaneously with the national convention of the Society.

CONVENTIONS AND MEETINGS

National Standard Parts Association Meeting, Chicago .....Dec. 2-3
Congress of American Industry, New York .....Dec. 7-9
SAE Annual Meeting, Detroit....Jan. 9-13

SHOWS AT HOME AND ABROAD

Indianapolis, Ind., Automobile Show, Nov. 19-25
Baltimore, Md., Automobile Show, Nov. 19-26
Rochester, N. Y., Automobile Show, Nov. 19-26
Long Island Automobile Show, World's Fair, N. Y. .....Nov. 23-Dec. 4
Newark, N. J., Automobile Show, Nov. 26-Dec. 3
Kansas City Automobile Show, Nov. 26-Dec. 3
National Motor Show of Canada, Toronto, Ont. .....Nov. 26-Dec. 3
New Orleans, La., Automobile Show, Dec. 3-5
Denver, Colo., Automobile Show, Dec. 5-10
Automotive Service Industries Show, Chicago .....Dec. 5-10
Grand Rapids, Mich., Automobile Show .....Jan. 2-7
National Motor Boat Show, New York, Jan. 6-14
Seattle, Wash., Automobile Show, Jan. 9-15
Berlin, Germany, Automobile Show, Feb. 17-March 5

Sloan Will Testify

To Be Witness at Hearings on "Incentive Taxation"

Alfred P. Sloan, Jr., chairman of the General Motors Corp., has accepted an invitation to appear as a witness next Monday at the opening of hearings by a sub-committee of the Senate Finance Committee on "incentive taxation." The sub-committee is headed by Senator Herring of Iowa. The hearings will be a part of a study of "profit sharing plans" in industry, and unusual interest is being manifested in Mr. Sloan's testimony in view of his announcement last Monday of General Motors payloan plan to stabilize employment and to protect in slack times workers engaged at hourly rates. The chief sponsor of incentive taxation legislation is Senator Vandenberg of Michigan.

Underlying the plan is the idea of legislation to encourage industry to share profits to a greater extent with employes. This would be done by permitting corporations to deduct a fixed percentage from taxes on the number of additional man-hours of employment given during the tax year.

Witnesses other than Mr. Sloan who are scheduled to appear before the sub-committee include representatives of the Eastman Kodak Co., and the Procter & Gamble Co., which operate profit sharing plans. Appearing for the American Federation of Labor will be President William Green, who, reflecting the traditional attitude of organized labor, will oppose incentive taxation legislation. There is no prospect of enactment of such legislation at the forthcoming session of Congress.

Labor

UAW Seeks to Strengthen Position Before Murphy Yields Governorship

With a sympathetic administration in Michigan going out of office at the first of the year the United Automobile Workers Union is making serious efforts to strengthen its position in the automotive industry before that time. Defeat of Governor Frank Murphy in the recent election has been accepted, even in UAW circles, as disapproval by the electorate of sit-down strikes.

Elmer Dowell, director of the UAW's General Motors division, has announced filing of formal notice seeking amendment of the present contract between GM and the union. Although the desired changes were not announced, it was believed that

STREET SCENES in Clearfield, Pa., show how automobile dealers of this small town displayed their 1939 models on Nov. 4 and 5 in a blocked-off street near the business district. The enterprising dealers are reported to have obtained 144 new sales prospects, eight outright sales. (See story in the right-hand column of this page.)

they would include a demand for a modified check-off system of dues collections and for changes in the present procedure for handling grievances.

A strike which began at the Reynolds Spring Co. in Jackson, Mich., on Nov. 9, was still in effect on Nov. 16 after pickets representing workers in the plant and for three other Jackson parts plants had prevented other workers from entering. The company had announced that employes willing to work could resume on Nov. 16 and had arranged for police protection but pickets so far outnumbered workers and police that a truce was called. It was also announced that negotiations would be resumed on the union's demand for wage increases, a closed shop and seniority rights.

A dues collecting drive by the Plymouth PAW local was dispersed by police on Nov. 16 and workers entered the plant unmolested. The union had announced that unless dues were paid by Nov. 15 workers would not be allowed to enter the plant.

A one-day strike at the Detroit plant of the Budd Wheel Co. and Edward G. Budd Mfg. Co. on Nov. 10 was settled after negotiations and workers returned to their places on Nov. 14. The strike had affected 2000 workers in the Budd plant and also had caused a layoff of 8000 workers in the Packard Motor Car Co. plant because of a parts shortage. The dispute which was branded as "wildcat" by company officials was said to have arisen out of UAW demands for sole bargaining rights.

The Clearfield Way

Dealers in Pennsylvania Town Showed '39 Cars on Street

Automobile dealers of Clearfield, Pa., believe they have found a practical and profitable solution to the obstacles that have stood in the way of small town automobile shows.

Jumping the gun by a full week on the National Automobile Show in New York City, the 12 dealers of this central Pennsylvania town held a joint display of 1939 models on Nov. 4 and 5 in a blocked-off street near the business district.

The results exceeded the fondest predictions. Dealers added up a total of 144 new sales prospects and made eight outright sales.

Held without bands or other fanfare, the show attracted an estimated 2500 persons out of a town population of 10,000. Most of the spectators came at night, when the street was lighted by a single string of bulbs and the glow from adjacent store windows.

Little expense was involved. All the dealers had to do was to drive their models to allotted places along the curb and keep eyes open and pencils busy for prospects. No building in the town could have accommodated both the crowd and the 23 models displayed, and none would have proved so accessible.

"Judging from the success of our show," said Droze Dotts, president of the Clearfield Auto Dealers Association, "the idea could be applied with equal results in other towns throughout the country. In fact, I predict that such shows will soon be an annual fixture in scores of towns."

The Clearfield dealers decided unanimously to repeat the show next year.

Publicity for the new venture was supplied in a 10-page "Auto Show" section of the Clearfield *Progress*, a daily serving the industrial and farming area around Clearfield. The *Progress* described the show as the first open-air exposition of its kind.

The public seemed as pleased as the dealers. One man, who planned to buy a car but hadn't decided which kind, said it was the first time he had been able to look over all the new models without "wearing himself out" visiting the individual showrooms.

The show was arranged on only one week's notice. Car distributors responded immediately, however, by sending new models before the usual date. They displayed a lively interest in the show.

News of the Industry

MACHINE TOOL INDEX UP

• The index of machine tool orders compiled by the National Machine Tool Builders' Association for October rose slightly to reach 118.1, only 0.7 of a point above September. The association report points out that an increase in domestic business was offset by a somewhat lower volume of foreign orders. The three months' trend continues upward.

UAW SIGNS EATON

• The United Automobile Workers and the Eaton Mfg. Co. signed a blanket contract last week covering nine of the company's plants. The contract expires May 15, 1940.

The contract grants to the union sole collective bargaining rights for all plants, grievance procedure, seniority rights, five-day, 40-hr. week, time and a half for overtime, and double time for Sundays and holidays.

SPEED UP IN LOS ANGELES

• All assembly plants of automobile companies in the Los Angeles district are speeding up production schedules to meet a substantial demand. These include Chrysler - Plymouth, Willys - Overland, Ford, General Motors and Studebaker, and Dodge and Moreland in the truck division.

It is understood that Chrysler and Ford are turning out an estimated 5000 cars each monthly, and General Motors is producing about 6000 units each month. Studebaker is reported to be turning out 1500 cars. The Willys-Overland plant, closed for some time, is reopening.

MORE ABOUT THE "PEOPLE'S CAR"

• The name of the concern engaged in developing the German Volkswagen was changed at a recent meeting to Volkswagenwerk, Gesellschaft mit beschränkter Haftung (People's Car Works, Inc.), and at the same time the share capital was increased to 50,000,000 marks. Headquarters of the firm are in Berlin. Heinrich Simon, treasurer of the German Labor Front, was elected managing director, but it was stated that the present board, consisting of Director Werlin, an industrialist of Munich, Dr. Lafferentz of the Labor Front, and Dr. Porsche, designer of the car, will remain in charge until the plant is completed and quantity production has begun.

• A decree issued in Germany recently forbids the use of the terms "Auto-Cemetery" and "Auto-Abattoir," as applied to accumulations of junked cars, after Dec. 31, 1938. Firms engaged in the business of buying and dismantling old autos may operate under the titles Autoverwerter, Autoverwertung, and Autoverwertungsbetrieb. (Verwertung-Realization). All old material from cars bought with the object of junking them must be offered for sale to buyers of old metal or junk within three monhts of the date of purchase of the cars. The decree is expected to do away with unsightly junk yards and also with loss of valuable material through rust and decay.

• Motor vehicle production in Germany during the first half year of 1938 continued at record levels, the American Commercial Attache at Berlin has reported to the Department of Commerce.

For the first six months, production of all types reached a total of 286,123 vehicles, a gain of 16.8 per cent over last year. Sales for the period were 287,664 vehicles, an increase of 7.5 per cent. The gain as compared with the last year was attributed to heavier exports since the number of domesitc sales was slightly below those of the same period.

While the volume of domestic sales for the first six months was lower, in value it was 5 per cent higher than last year. Foreign sales, on the other hand, increased in value at a lesser rate than they increased in volume, the report said.

GM OCTOBER SALES DROPPED

• October sales of General Motors cars and trucks from all sources of manufacture totalled 123,835 compared with 166,939 in October a year ago. Sales in September were 36,335. Sales for the first 10 months of 1938 totalled 919,584 compared with 1,761,317 for the same 10 months of 1937.

Sales to dealers in the United States totalled 92,890 in October compared with 136,370 in October a year ago. Sales in September were 16,469. Sales for the first 10 months of 1938 totalled 625,585 compared with 1,418,608 for the same 10 months of 1937.

Sales to consumers in the United States totalled 68,986 in October compared with 107,216 in October a year ago. Sales in September were 40,796. Sales for the first 10 months of 1938 totalled 751,495 compared with 1,387,146 for the same 10 months of 1937.

FINANCING OFF 22.3 PER CENT

• Dollar volume of retail automobile financing for September, 1938, amounted to $67,240,610, according to statistics released by the Bureau of the Census, Department of Commerce. Compared with August, 1938, this is a decrease of 22.3 per cent. The volume of wholesale financing for September this year amounted to $28,500,118, a decrease of 31.9 per cent when compared with the preceding month.

Workers Want Peace

(Continued from page 665)

settle no argument," Mr. Knudsen said.

"Bigger nations must extend their good will and cooperation to smaller nations if the world is to have any degree of prosperity and peace," Mr. Graham, chairman of the meeting, said.

"Export men have done their best to give back many jobs to automobile workers in the United States," he added.

"If any nation on earth could exist without foreign trade it is the United States," Assistant Secretary Patterson said. "However, we need imports and we need exports. Hence the Administration's policy of reciprocal trade treaties is of the greatest importance to American industry.

"If the nations of the world could be relieved of the threat and talk of war, the self-sufficiency policies abroad would vanish," he predicted.

He expressed the gratitude of the Administration for the "unswerving and courageous support which the trade agreements program has received from its inception from the automobile manufacturing industry."

Herbert H. Rice

Herbert H. Rice, former vice-president of the General Motors Corp. and also former president of the Cadillac Motor Car Co., died of a heart attack on Nov. 15 while on a hunting trip in northern Michigan.

U. S. New Car Registrations and Estimated Dollar Volume by Retail Price Classes*

Falling-off of new car registrations continued through September with that month showing 34,686 less than August. This represented a decrease in registrations of approximately 27 per cent. Dollar volume decreased at about the same rate as indicated below:

	NEW REGISTRATIONS			ESTIMATED DOLLAR VOLUME		
	September	Nine Months		September	Nine Months	
		Units	Per Cent of Total		Dollar Volume	Per Cent of Total
Chevrolet, Ford and Plymouth	60,182	792,783	60.25	$45,300,000	$597,100,000	52.40
Others under $1000	17,526	287,454	21.85	15,900,000	262,600,000	23.05
$1001-$1500	14,436	220,246	16.74	16,200,000	245,900,000	21.57
$1501-$2000	555	9,103	.69	900,000	15,600,000	1.37
$2001-$3000	410	5,272	.40	1,100,000	14,100,000	1.24
$3001 and over	56	874	.07	300,000	4,200,000	.37
Total	93,165	1,315,732	100.00	$79,700,000	$1,139,500,000	100.00
Miscellaneous	104	1,109				
Total	93,269	1,316,841†				

* All calculations are based on delivered price at factory of the five-passenger, four-door sedan, in conjunction with actual new car registrations of each model. The total dollar volumes are then consolidated by price classes.

† Data from Wisconsin not complete.

Molding Press

. . . New machine has capacity of 32 ounces of plastic material per shot

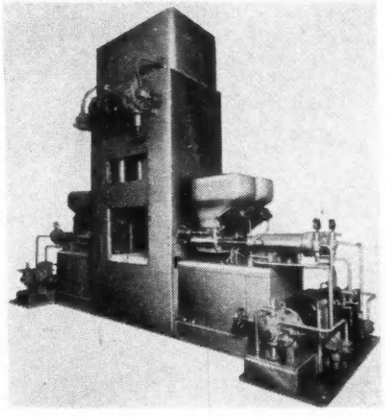
Latest machine development to be produced by the Hydraulic Press Mfg. Co., Mount Gilead, Ohio, is the model 500 hydro-power injection molding press with a capacity of 32 ounces per shot. The press is of the vertical downward acting mold clamp type. Two 8-ounce capacity injection units are mounted on each side.

The power unit for operating the clamp is mounted overhead on the back of the frame. The surge tank containing the operating oil is mounted overhead. Auxiliary reservoirs, connected with the surge tank, are provided under each injection unit. Separate power units for each injection unit are mounted on these auxiliary reservoirs just back of the injection cylinder supports. A hydraulic ejector is built into the base of the clamp.

Internal Radius Grinder

. . . Van Norman machine for small raceway grinding

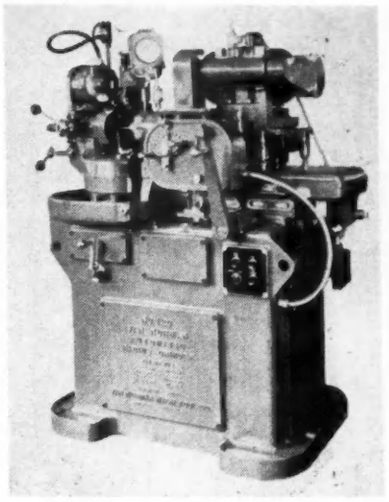
A radius grinder designed for grinding raceways of the smallest ball-bearing outer rings up to the 204 size (approximately 1⅞ in. diameter) was recently introduced by the Van Norman Machine Tool Co., Springfield, Mass.



Injection molding press with capacity of 32 ounces per shot.

To operate the model 120, as it is called, the race is placed in the holding fixture and the machine is started by a finger-touch lever which automatically moves the wheel into grinding position and coincidentally retracts the wheel to compensate for stock removal. The workhead starts rotating and oscillating and the wheel feeds into the work. When the race is ground to size, the wheel removes to unloading position and the workhead stops. The complete grinding cycle functions automatically by simple standardized electrical controls which are concealed in the rear of the machine.

Since electric gaging is not satisfactory for very small sizes, No. 120 is arranged not only for electric gaging, but also with an electric control on the feed drum so that when the wheel is fed to the point of proper size, the slide will automatically remove to unloading position.



Van Norman radius grinder

Written by the Guaranty Trust Co., New York

Most reports of business reflect further gains in activity in the week that included election day and the Armistice holiday. The *Journal of Commerce* index for the preceding week, which ended Nov. 5, registered a slight decline to 89.7 from a revised figure of 90.6 in the preceding week. A year earlier the index stood at 91.6.

Railway freight loadings in the same week resumed the seasonal decline that had first appeared two weeks earlier. Loadings totaled 673,333 cars, as compared with 708,840 cars in the preceding week and 728,765 cars a year earlier. All classes of commodities registered fewer loadings than in the week before.

The estimated average daily production of crude oil in the same period was 3,628,550 barrels, or 391,000 barrels more than in the preceding week. This output compares with the November daily demand figure of 3,391,000 barrels, as calculated by the U. S. Department of the Interior.

The average daily production of soft coal in the week ended Nov. 5 was 1,333,000 tons, as compared with 1,426,000 tons in the preceding week and 1,433,000 tons a year earlier.

Rayon yarn production in the third quarter of the year, according to *The Rayon Organon,* totaled 68,300,000 lb., the largest quarterly output reported this year. This output was 20 per cent greater than the second quarter figure. Shipments in the September quarter exceeded the June quarter figure by 90 per cent and were reflected in a reduction of 50 per cent in yarn inventories held by producers between June 30 and Sept. 30. Producers' stocks at the end of October were said to equal less than two months' supply.

Professor Fisher's index of wholesale commodity prices for the week ended Nov. 12 stood at 80.5, as compared with 80.4 a week and two weeks earlier.

Member bank reserve balances declined $139,820,000 in the week ended Nov. 9; total bills discounted were reduced by a negligible amount; and industrial advances remained substantially unchanged. Estimated excess reserves declined $90,000,000 to a total of $3,130,000,000.

Ourselves and Government

"Anti-Monopoly" Committee to Study Restriction of Patented Devices; FTC Closes Arguments in Case vs. GM

A weekly check list of legislative, executive and judical actions affecting the automotive industries. First appeared in June 25 issue, p. 831. Corrected to Nov. 17.

Legislative Legacies

MONOPOLY STUDY. Following a conference with President Roosevelt Nov. 14, Senator O'Mahoney, chairman of the Temporary National Economic (anti-monopoly) Committee announced that restriction of patented devices will be the initial subject the committee will study and that hearings, with Government investigators the first witnesses, will probably begin the first week in December. After adjournment for the Christmas holidays hearings will be resumed.

LABOR RELATIONS CASES

The NLRB has issued its second order directing the Inland Steel Co., Chicago, to bargain collectively with the CIO Steel Workers Organizing Committee and to incorporate any terms reached in a signed agreement. The company was also directed to disband the Steel Workers Independent Union, Inc., which the Board described as an "inside" organization. The Board's first order, issued last April, was subsequently withdrawn to correct procedural matters and to give another for the filing of briefs and presenting oral argument.

Counsel for the Fansteel Metallurgical Corp., of North Chicago, told the Supreme Court early this week that the illegality of the sitdown strike cannot be doubted and that it constitutes more than ample cause for the discharge of the participants. The Circuit Court of Chicago had upheld this view after the Board had issued an order against the company, charging unfair labor practices in the discharge of the employees. The Board then took the case to the Supreme Court where it is now pending.

LABOR DEPARTMENT

WAGE AND HOUR DIVISION. Administrator Andrews has named Ralph J. Watkins, Director of the Bureau of Business Research of the University of Pittsburgh and member of the committee on Chemical Economics of the National Research Council, to the post of Assistant Administrator in charge of the Wage and Hour Standards Division.

Carroll R. Daugherty, former professor of economics at the University of Pittsburgh and director of the Labor Department's labor productivity studies of the automobile and the iron and steel industries in 1936, has been appointed chief economist.

FEDERAL TRADE COMMISSION

VS. GENERAL MOTORS. Hearings currently under way in New York are running the transcript of the case up to 28,000 pages. The FTC has closed its side of the arguments and will hear testimony from now on from the company. May again hold hearings in at least part of the 17 cities already covered when testimony on the FTC's side of the case was given. The complaint involves the alleged practice of requiring dealers to handle respondent's parts only.

SIX PER CENT CASE. Ford filed a brief answering the Commission last week. Next step will be to hold oral arguments. FTC cited Ford and General Motors in July, 1937, complaining of false and misleading representations in advertising finance plans.

FOB PRICES case vs. G.M. and Ford. Robert S. Hall is trial examiner and James M. Hammond, FTC attorney. Case involves FTC allegations that price advertising was misleading because of failure to include standard equipment.

FAIR TRADE PRACTICE rules for retail automobile dealers, introduced at public hearings during last NADA meeting in December (see A.I., April 30, 1938), are still under study by the FTC fair trade practice division headed by George McCorkle.

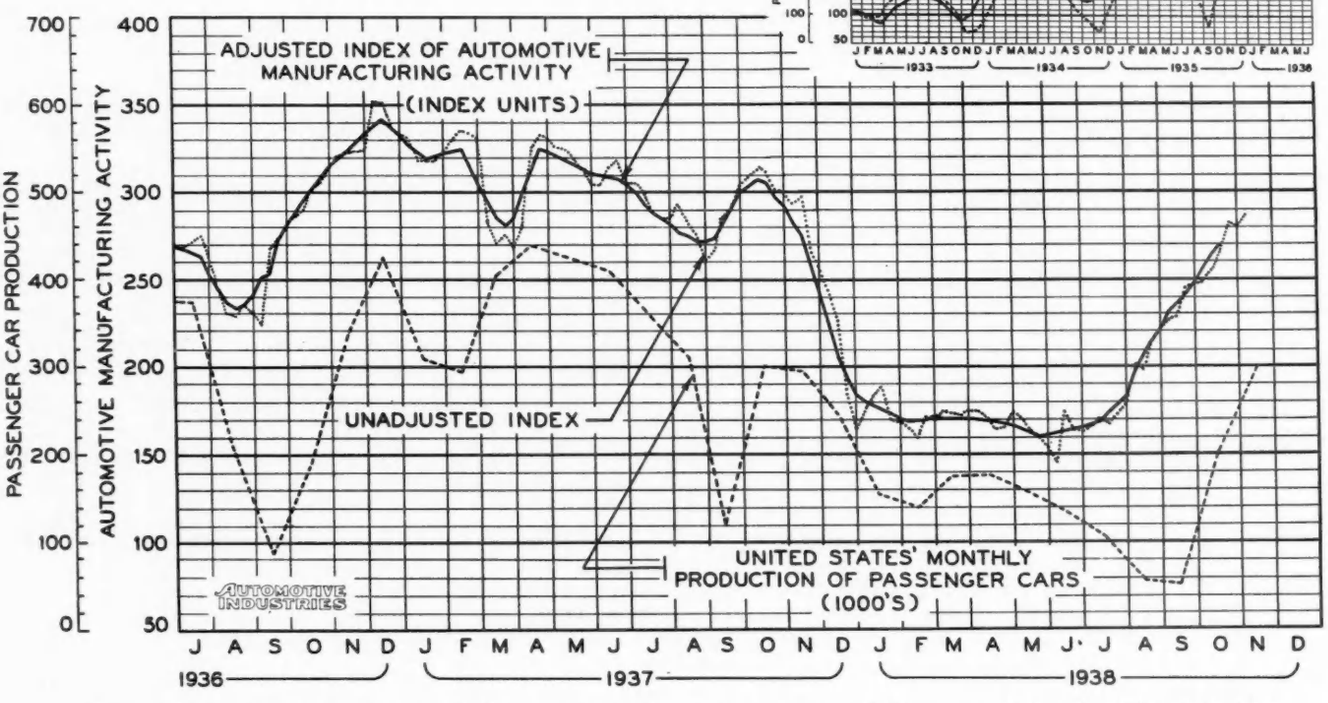
DEPARTMENT OF JUSTICE

ANTI-TRUST CASE. Federal Judge Slick of the U. S. District Court at South Bend has given provisional approval to the Chrysler and Ford consent decrees. Final settlement hinges on the outcome of the GM hearing scheduled for Nov. 18 at Hammond. (See story on page 662.)

WAR DEPARTMENT

A White House conference on Tuesday attended by several cabinet members and Assistant Secretary of War Johnson and Gen. Malin Craig, chief of staff, concerned the aircraft problem and its relation to national defense. No figures were released to indicate the extent of aircraft production under the program to be recommended to Congress in January.

Automotive Activity Recovers To Reach Unadjusted Index of 287


ADJUSTED INDEX OF AUTOMOTIVE MANUFACTURING ACTIVITY
(INDEX UNITS)
UNADJUSTED INDEX
UNITED STATES' MONTHLY PRODUCTION OF PASSENGER CARS (1000'S)
PASSENGER CAR PRODUCTION
AUTOMOTIVE MANUFACTURING ACTIVITY
AUTOMOTIVE INDUSTRIES
J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D
1936
1937
1938
UNITED STATES' MONTHLY PRODUCTION OF PASSENGER CARS
ADJUSTED INDEX OF AUTOMOTIVE MANUFACTURING ACTIVITY
PRODUCTION
ACTIVITY
1933
1934
1935
1936

Recovering after a momentary falter registered the preceding week, the rate of manufacturing activity in automotive plants resumed its upward movement to reach the unadjusted index figure of 287 for the week ending Nov. 12. This is a gain of 7 points over the week ending Nov. 5 for which the unadjusted index registered at 280. The increase preserved the upward trend of the adjusted index of manufacturing activity which has now attained a magnitude of 270.

Almost paralleling the rate curve is the line which traces the production of passenger cars in the United States. The latter has now attained the 300,000 mark.

Just Among Ourselves

News of the Week

ITEM: There were two motor vehicle shows held in New York during the week beginning Nov. 11. Both played to a diminished public, but accomplished a great many useful functions otherwise. Amen.

Two things of broader significance stand out from the mass of drivel which is show-week publicity. At the S.A.E. Annual Dinner on Nov. 14, H. W. Prentis, president, Armstrong Cork Co., referred to the "Platform for American Industry" formulated by the Committee on Industrial Practices of the National Association of Manufacturers of which he served as chairman.

The code, he affirmed, represents the first expression of any national group of manufacturers in any country of the principles that should guide business men who desire to conduct their enterprises on a high ethical plane. The widespread acceptance which the Platform has found leads Mr. Prentis to believe that there is a growing sense of "social stewardship in industry."

There were many other things worthy of emphasis in his speech. It was a good speech, and would provide at least one answer to Mr. Walter B. Pitkin's hope that the political right wing should find spell binders to equal those of the left.

But I have selected Mr. Prentis's phrase about "social stewardship" for emphasis because, hardly had his words passed through the microphones in the Ballroom of the Commodore Hotel, before the General Motors private-enterprise social-security plan was the principal subject of conversation throughout the automotive sphere of influence.

Last year General Motors established a revolving fund of $60,000,000 to be used for accumulating inventories of usable parts when work on the assembly lines tapered off. This action helped to add millions of man hours of labor to the low points in the employment curve, and was an effective contribution to the stabilization of the individual's work cycle.

In the two additional contributions which are described in detail in this week's news section the corporation introduces experimental plans which are designed to provide supplementary security for thousands of workers who have remained on the corporation's payrolls two years or longer.

According to the published statements concerning the new plans, Government unemployment benefits where they are available, become an integral part of the calculations leading to determining the amount of wage advance to which the individual is entitled during slack periods. This fact, as I see it, both points out the deficiencies of the governmental program and assumes a sort of final responsibility for the individual worker's welfare.

Previously, a number of corporations whose products are not seasonal in character, have established some form of work-stabilization program. Usually it has involved, at some time during the year, manufacturing a product in quantities in excess of current demand, and storing the excess in warehouses.

The cost of such a program for an industry whose products are as bulky as ours, which change radically in style from year to year, and which are subject to deterioration from disuse, would be prohibitive. General Motors, it seems, has hit on a new and happy expedient for getting over this hurdle by storing up a reservoir of available man-hours rather than of physical product.

This is a contribution of profound significance to the science of management and of sociology. It will have a profound effect on the lives, not only of the individuals who derive a measure of security from it, but on scores of communities where General Motor's operations are located. It will be an incentive to local managers to stabilize work as far as possible without "going into debt" to do so, and it will be an incentive to hundreds of other corporations which may be impelled unconsciously to obey the Biblical injunction to "go thou, and do likewise."

The plan may be modified; it may have some "bugs" in it. The results may fall short of expectations. But whatever happens to it, it is important.

—HERBERT HOSKING.

THE CHILTON ROUND TABLE

In order to give readers of AUTOMOTIVE INDUSTRIES a clue to certain merchandising and service aspects of the automotive industry which are normally outside the scope of an industrial publication, we present herewith excerpts from the November issues of the four other magazines published by the Automotive Division of the Chilton Co.

FROM MOTOR WORLD WHOLESALE

Automobile touring accounted for expenditures of four and one-half to five billion dollars in 1937. It is estimated that touring this year will be off about 20 per cent from 1937. Trips to the New York and San Francisco expositions in 1939 are expected to have a tremendous influence in bringing touring expenditures up to a new high.

FROM AUTOMOBILE TRADE JOURNAL

Early car announcements met with such hearty response that manufacturers have been obliged to speed up their production schedules. All in all, therefore, the show season comes at a time when enough sampling has been done to show that the new styling is meeting with approval and at a time when the general business index curve has started upward instead of downward, as was the case a year ago.

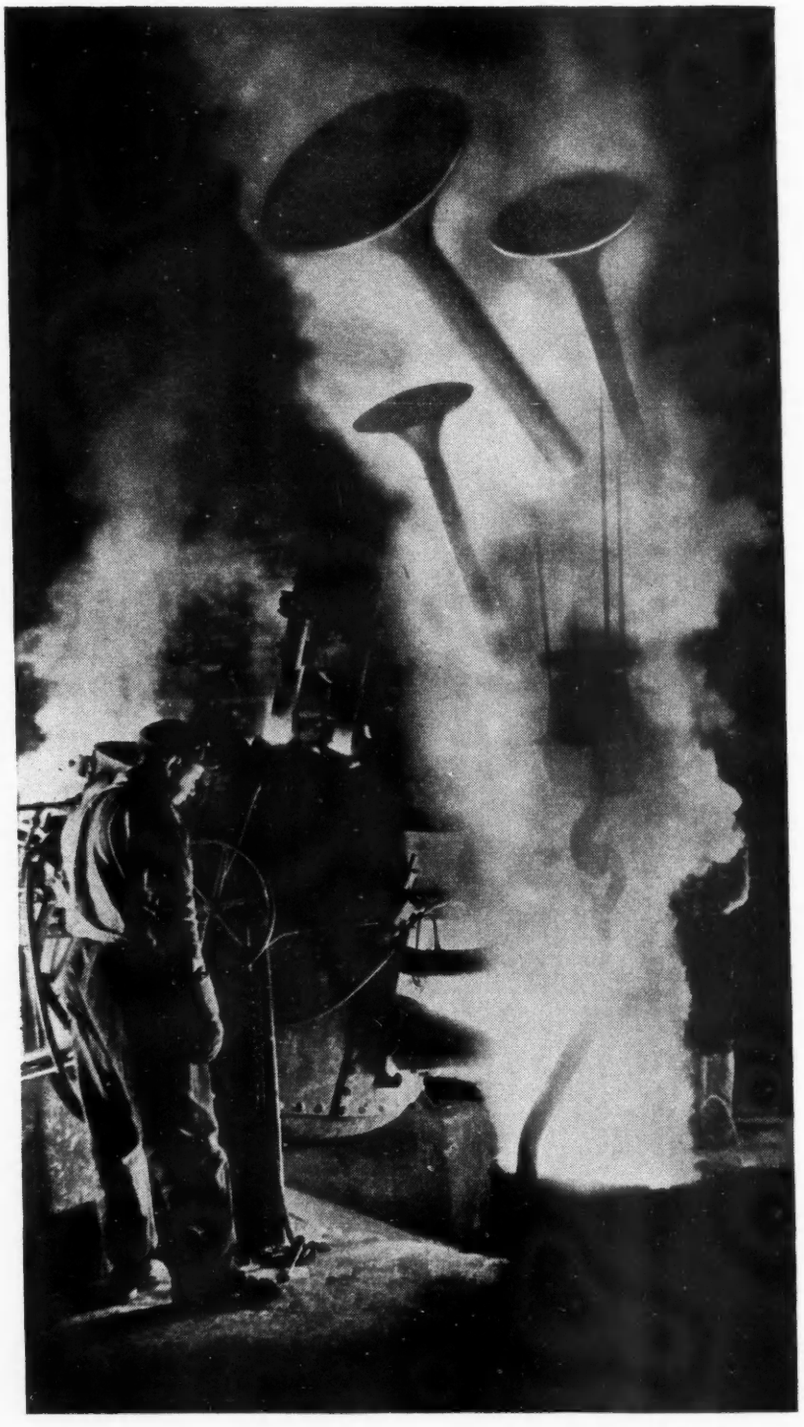
FROM MOTOR AGE

Establishment of a post graduate course in the engineering principles as an extension of nation wide clinic has been announced. It will function in more than 200 cities with a staff of 44 automobile engineers.

FROM COMMERCIAL CAR JOURNAL

There is some talk of selling trucks on the rental or pay-as-you-use basis, similar to the practice prevalent in the bus business. Will it get very far in the truck business? In statements from enlightened sources there is difference of opinion.

Valve



Materials—

have been steadily improved to the point where producers can meet almost any requirement

By H. E. BLANK, JR.

YEARS ago an engineer discussing valve steels aptly remarked, "the requirements of the ideal valve material are frequently incompatible." The statement is just as true today as it was when made, and despite the vast store of additional knowledge revealed by research in the interim it is still impossible to produce materials which will fulfill every requirement of valves for the modern internal combustion engine. It is also true, however, that persistent research has brought the art of producing valve materials to a point where almost every single requirement can be met. Difficulties which were serious problems not long ago have been conquered. For instance, the question of heat-treating valve steels to obtain "regularity, reliability and freedom from strain" is no longer of serious import. Similarly, the difficulties associated with the air-hardening of steels have been eliminated. A formidable enemy, scaling, has been virtually defeated. And, so far as resistance to burning or hot oxidation is concerned, many valve steels available now are excellent.

Problems confronting metallurgists, designers, and manufacturers concerned with the production of commercial valve steels are increasing in complexity with the trend in engine design leading toward higher outputs and speeds, which impose increasingly severe service conditions. Of the destructive influences at work while the engine is operating, one of the most insidious is heat. The heat flow to the valves, of course, increases as horsepower output and speed of an engine are boosted. Nonetheless, there are valves commercially available which test observation shows will perform satisfactorily for 50,000 miles without grinding. In fact, there are instances reported of trouble-free service for 100,000 miles. Around 1910 it was not uncommon for the average motorist to have "his valves ground" four times a year, inasmuch as it was necessary for valves to be ground about every 1000 miles of operation.

Prior to 1905 plain carbon steel was in general use for exhaust valves. In some instances, especially for air-cooled engines, it was found advantageous to employ a 98 per cent nickel steel as the valve material. Reports of early practice indicate also that a 32 per cent nickel steel was sometimes used. Other types regarded with favor during the period 1900-1906 were a 5 per cent nickel steel and an alloy containing 4 per cent nickel and 1 per cent chromium. Valves made of cast-iron became fairly popular from 1906 to 1911. References to valve design during this period also mention a valve made by welding a head of 3½ per cent nickel steel to a stem of carbon steel. Around 1911 the tungsten steel valve was introduced and quickly won prominence, despite its high cost of from three to six times more than other contemporary valves. All of the war-time Liberty engines used valves of tungsten steel.

The next significant development in valve steels appeared in 1914. About that time the virtues of a 15 per cent chromium steel were revealed, although widespread adoption of the material for valves was impeded by war-time conditions and it did not come into general use until 1916. This material was found to be especially good for aircraft engine valves, because of its high resistance to burning. Close on the heels of this discovery came cobalt-chrome steel, another World War product brought forth in England. As a valve material the cobalt-chrome steel was vastly superior to tungsten steel, especially with regard to the non-scaling property.

An important milestone on the road leading to discovery of the valve

21 Automotive Materials

materials available today was the announcement in 1919 of a steel containing chromium and silicon. In ordinary language, this alloy was simply "one of the known stainless steels with a silicon content of 3 per cent, instead of less than one." A clean sweep of the field was made by this material and it virtually displaced most of the valve materials then in use.

The cast-iron head type of exhaust valve, its demise signalled by the introduction of the stainless steels with 3 per cent silicon content, is now virtually extinct. It persevered for some time as a material wholly suitable for inlet valves, but even for this application it is no longer used and has been relegated to the museum along with many others. Inlet valves rarely must withstand the deleterious effects of high heat flow to which exhaust valves are subjected, although for some aircraft engines the inlet valve material closely approaches that used for the exhaust valves. A good structural steel "having the same life characteristics that any highly stressed steel should have" will be satisfactory for the automotive engine inlet valve. A number of valve materials other than those mentioned have appeared on the scene in recent years. Many of them contain considerable amounts of chromium and silicon substitutes, such as aluminum or zirconium.

Substitutes for Steel

Substitutes for steel valve materials were offered as early as 1910 and various modifications of nonferrous metals have been suggested since that time. For various reasons, perhaps prohibitive cost or inability to retain strength at red heat, these types have not been used very widely. Failure of these substitutes for steels to thus far capture the market is no indication, however, that the door leading to general acceptance as commercial valve materials is forever barred to them because, said the late Robert Jardine, "present-day conditions call for cooling of the valve that can only be obtained to the maximum degree by using a material in the valve that has a higher heat conductivity than has any of the present-day exhaust valve materials, and it is a notable fact that everything that we have done to make valves resist burning has lessened their heat conductivity, so that we may be getting good in one direction but not any better in another direction."

There are a number of requirements which a material for the exhaust valves built into a modern engine of high output and speed must fulfill. One of the most important is the ability to retain strength at the high temperatures which prevail within the engine under extreme operating conditions. The material must exhibit excellent resistance to the corrosive effects of the products of combustion; likewise, it must resist the deleterious influence of rust which may occur during periods when the engine is idle. The transformation temperature of the material must exceed the maximum engine operating temperature, in order that distortion of the valve will be minimized. Good wear resistance is essential not only at the valve seat, but also at the foot and along the stem. The material must be able to retain its original physical characteristics throughout the gamut of temperature fluctuations in the engine. And, for its final acceptance as a commercial product, the material must be economical to fabricate.

Valve Steels in Two Groups

Present-day valve steels may be classified into two groups: the hardenable type and the austenitic type. In general, the latter are better able to retain their high strength at elevated engine temperatures. They show excellent resistance to the etching effects deriving from the products of combustion. While the foregoing are very desirable properties, the austenitic type also exhibits several undesirable ones. Inasmuch as the coefficient of expansion of this type is relatively high, valve stems made of the material will elongate in service, making necessary greater tappet clearance. Austenitic steels also will fall short of wear requirements of some installations and cannot be hardened by heat treatment. The notes of one engineer point out, however, that when valves of the austenitic type are used wear is apparent only when lubrication is insufficient. He says, "Even though relatively soft, this material takes on a surface condition that gives very long life providing scuffing or cutting does not occur due to lack of oil." Inasmuch as engine outputs and speeds are being boosted constantly it appears reasonable to take the view of one authority who makes the prediction that "the austenitic type steels, despite several disadvantages, will be more widely adopted in the future."

While the influence of any one element when used singly in steels may be predicted with fair accuracy, it is extremely difficult and frequently impossible to forecast precisely what the final result will be when the same element is introduced into an alloy steel. Due to the other constituents in the analysis, the effect may be entirely different. Studies of carbon steels have brought forth a great fund of knowledge as to the effect of carbon in such steels, but it still remains a dark mystery as to exactly what will be the effect of varying the amount of carbon addition in the complicated alloy steels. In general it can be said that the ability of an alloy steel to retain its strength at high temperatures is directly affected by variations in the carbon content. A carbon addition will also increase the stability of an austenitic type of steel.

The presence of silicon raises the resistance of the steel to burning, especially in those analyses containing chromium. Also, silicon in combination with chromium can be used to raise the transformation point of the steel to a temperature considerably above that which may be anticipated in service. Manganese tends to increase the hot tensile strength of the final product. Valve steel materials high in manganese content possess excellent wear properties, but offer difficulties in machining. The elements, nickel and chromium, are used in varying amounts in the majority of valve steels now commercially available. Their effect is to increase the hot tensile strength, also to inhibit the formation of scale. Tungsten is not used today in the quantities it used to be, some valve materials containing previously as much as 18 per cent. Generally, it may be said that this element raises the hot tensile strength. While cobalt and molybdenum have been used with some success in valve steels, not a great deal is known of their effect as compared with the information available on other elements. Their effect is in general comparable with that of tungsten. Even more rarely used in valve steels are the elements, vanadium and aluminum.

Salt- or sodium-cooled valves are now used almost universally for high-horsepower aircraft engines. The relatively high cost of this type of valve has deterred its more widespread adoption, but according to Robert Jardine and R. S. Jardine, "they surely will find their place because they will do for the valves what the engine designer probably never will be able to do by any changes or improvements in cooling brought about by changes that cost less than the price of the sodium-cooled valve."

Valve Materials—American Passenger Cars

Passenger Car Make	1938 MODELS		1939 MODELS	
	Intake	Exhaust	Intake	Exhaust
Bantam	Chrome Nickel Steel	Silicon Chromium	S.A.E. 3140	Chrome Nickel
Buick	S.A.E. 3140 or S.A.E. 1050	Silcrome No. 1 or 2112	S.A.E. 1050	Sil-XB
Cadillac-V8	S.A.E. 3140	Silcrome No. 10	S.A.E. 3140	Sil-X
Cadillac-Sixteen	S.A.E. 3140	S.A.E. 82120	S.A.E. 3140	Sil-X
Chevrolet	Extruded Steel	Extruded Steel	Extruded Steel	Extruded Steel
Chrysler-Royal	Chrome Nickel Steel	Silcrome No. 10		Silcrome
Chrysler-Imperial	Chrome Nickel Steel	Silcrome No. 10	Chrome Nickel Steel	Silcrome
Chrysler-Cust. Imp.	Chrome Nickel Steel	Silcrome No. 10	Chrome Nickel Steel	
De Soto	Chrome Nickel Steel	Silcrome No. 10	Chrome Nickel Steel	Sil-XB
Dodge	Chrome Nickel Steel	Silcrome No. 1	Chrome Nickel Steel	Sil-XB
Ford			Chrome Nickel Steel	Chrome Nickel Steel
Graham	Chrome Nickel Steel	XCR	Chrome Nickel Steel	XCR
Hudson	S.A.E. 3140	XB	Chrome Nickel Steel	Sil-X
Hupmobile	Chrome Nickel Steel	Chrome Nickel Tungsten Steel	S.A.E. 3140	S.A.E. 2112
La Salle			S.A.E. 3140	G.M. No. 82120
Lincoln V-12	S.A.E. 3140	Silcrome No. 10		
Lincoln-Zephyr	Chrome Nickel Steel		Chrome Nickel Steel	
Mercury	Not made	Not made	Chrome Nickel Steel	Chrome Nickel Steel
Nash-Lafayette	Chrome Nickel Steel	Chrome Nickel Silcrome Steel	Chrome Nickel Steel	Chrome Nickel Steel
Nash- Ambassador Six	Chrome Nickel Steel	Chrome Nickel Silcrome Steel	Chrome Nickel Steel	Sil-X
Nash-Ambassador Eight	S.A.E. 3140	Chrome Nickel Silcrome Steel	Chrome Nickel Steel	Sil-X
Oldsmobile	S.A.E. 3140	Silcrome No. 10	S.A.E. 3140	XCR
Overland	Not made	Not made	Chrome Nickel Steel	Sil-X
Packard	Chrome Nickel Steel	Austenitic Steel	Chrome Nickel Steel	Sil-X
Pierce-Arrow 1801	Chrome Nickel Steel	Silcrome Steel	Not made	Not made
Pierce-Arrow 1802, 1803	S.A.E. 3140	Silcrome Steel	Not made	Not made
Plymouth	Chrome Nickel Steel	Silcrome No. 1	Chrome Nickel Steel	Sil-XB
Pontiac-Six	Silicon Chromium	Silicon Chromium	Chrome Nickel Steel	Sil-XB
Pontiac-Eight	Silicon Chromium	Silicon Chromium	Silicon Chromium	Sil-XB
Studebaker	Chrome Nickel Steel	Silcrome No. 1 or Detroit R-4	Chrome Nickel Steel	Sil-I
Willys	Nickel Chromium	G.M. 82120 or S.A.E. 3140	Chrome Nickel Steel	Sil-X

Antedating the sodium- or salt-cooled valves were the water-cooled, oil-cooled, and mercury-cooled valves. Mercury-valves have been used with some success in small engines. Advantages of sodium for this application include a low melting point of 207.5 deg. Fahr., a low specific gravity of 0.732, high specific heat, and a high boiling point of 1620.5 deg. Fahr. Another advantage of metallic sodium when used as a cooling medium in valves is that it will not form a hard substance when it cools from the molten state and returns to its original form. Salts commonly used for this purpose today are lithium nitrate and potassium nitrate.

Poor design, of course, will render valueless the finest valve materials. In general it may be said that an exhaust valve head should be so shaped that it will absorb the least amount of heat. The head may be made slightly concave, such a shape tending to lessen the rim stress. Some valves are made tulip shaped and most of the head material in this type is under tension. A tulip-shaped valve, however, may "mushroom" when extremely hot. For aircraft valves a heavy reinforced rim has been recommended as good practice. A large overhang of the valve over the seat is regarded as poor practice. One authority suggests in this regard that with good seat inserts available it is desirable to eliminate the overhang. Some designers frown upon the practice of putting a screwdriver slot in valves, claiming that a head with a ¼-in. cut in it would

not retain its shape under the influence of repeated heating and cooling. Objections are raised also to spanner holes. They are said to occasionally burn through and that cracks leading to valve failures have started due to the top edges of these holes getting too hot. Some spring retainers are claimed to cause trouble, and one writer remarks that "split taper collars with one or more grooves are really the most suitable."

Some years ago the material of the cylinder block was found to be well able to maintain a good seat for the valve, but more recently changed conditions have brought about many valve failures where this practice has been followed. The cylinder block material erodes fairly rapidly, with the usual consequence of a bad leak and subsequent quick failure. The seat insert is generally regarded as the answer to this difficulty. For seats, a material is required which will retain its original properties at elevated temperatures and resist erosion. Stellite has been found especially good for this application.

Considerable attention is again being given to the width of valve seats. The practice of using a narrow seat was adopted when high-speed steels were generally used for valves. As previously mentioned, however, the tungsten type was superseded by the steels containing chromium and silicon, due to its relatively low resistance to burning at increased engine operating temperatures. Coincidental with this shift in the materials scene, seat widths were increased, as it was assumed that wider seats would provide better valve cooling, necessitated by the fact that the hardness of the steels containing chromium and silicon was lower at red heat, and considerable wear resulted with the narrow-type seat. In a great many instances this theory was proved incorrect. Actual contact area of the wide-seated valve pitted by indentation due to trapping of hard carbon particles was less than that of a narrow seat of a harder material.

The designers of 1939 American passenger cars have made several noteworthy changes affecting the valves and valve seat inserts. Cadillac is now oxidizing valve tappets at their contact surfaces in order to reduce wear. Chevrolet also has moved in this direction and is now giving the surface of the tappet in contact with the cam a higher finish and has designed the lower ends of the push-rods with spherical seats. Valve seat inserts for both inlets and exhausts are being used on Ford V-85 and V-95 engines. A new chromium-silicon steel has been adopted by Plymouth for exhaust valves. The reader is referred to the table on page 675 which lists the materials being used for inlet and exhaust valves on 1939 model American passenger cars and also presents comparable data for the 1938 models.

American Manufacturers of Engine Valves

Aluminum Industries, Inc., Cincinnati, Ohio.
Arrow Head Steel Products Co., Minneapolis, Minn.
Berg Automotive Products Co., Chicago.
Boyle Motor Products Co., Chicago.
Detroit Motor Valve Co., division of Eaton Mfg. Co., Detroit.
Elgin Machine Works, Elgin, Ill.
Jadson Motor Products Co., Bell, Calif.
Manley Products Corp., York, Pa.
Michigan Engine Valve Co., Detroit.
Remco Products Corp., York, Pa.
Sealed Power Corp., Muskegon, Mich.
Simmons Mfg. Co., Ashland, Ohio.
Thompson Products, Inc., Cleveland.
Toledo Steel Products Co., Toledo, Ohio.
Universal Parts, Inc., Chicago.
Wilcox-Rich division of Eaton Mfg. Co., Detroit.

Automotive *Materials* NEW DEVELOPMENTS

Beryllium Used In Welding Alloy

The importance of beryllium in making possible some of today's applications of resistance welding was pointed out recently by Dr. R. H. Harrington of the General Electric Research Laboratory in speaking at the annual meeting of the American Welding Society at Detroit.

Copper is an excellent conductor of electricity but the metal is soft; the copper - beryllium - chromium alloy, known as Trodaloy, has somewhat

lower electric conductivity—although still higher than required for the work—but it is much harder, tougher, and usable at higher temperatures. Developed in the GE laboratory, it is being produced today by a half dozen licensees.

Still another Trodaloy, containing four parts of beryllium, 26 parts of cobalt, and 970 parts of copper, has even higher hardness, temperature and tensile strength values, but a somewhat lower electric conductivity.

The development of beryllium-copper alloys, which accounted for 90 per cent of the domestic consumption of beryllium in 1933, increased the use of the metal and materially reduced its cost. In 1923, when no useful application of beryllium was known, the market price of beryllium was $5,000 per lb. Today the price has been brought down to about $23 per lb. as a result of more efficient methods in production and an increased demand for the metal.

Beryllium is obtained from beryl ore which is found in widely scattered parts of the world. The largest deposits of the ore in this country are in the Black Hills of South Dakota. The largest single beryl crystal ever reported was found several years ago in Brazil. Its dimensions were approximately 17 ft. by 40 in., and it weighed about three tons.

Commercially, beryllium has come to hold the same significance to copper as carbon does to iron for the production of steel. One of the lightest metals known, beryllium is a third lighter than aluminum. It weighs only about one-fourth as much as steel, although it has 90 per cent the tensile strength of that metal. Beryllium has an exceptionally high melting point of higher than 2300 deg. Fahr., and has a high modulus of elasticity, 27,000,000 lb. per sq. in.

High-Speed Process For Plating of Copper

A new high-speed process for plating of copper, said to be four times as fast as the ordinary cyanide processes, has been developed by the electroplating chemicals division of the du Pont company. Heavy coatings from 0.001 in. to 0.003 in. can be obtained in from 10 to 20 min., leaving excellent surfaces for direct depositions of bright or dull nickel. The deposits are reported to be uniformly bright, free from pits, and easily buffed.

Coatings up to 0.003 in. have been produced in tests in two and one-half hours. The new process can be installed in the usual cyanide plating equipment, and high-purity copper anodes are required.

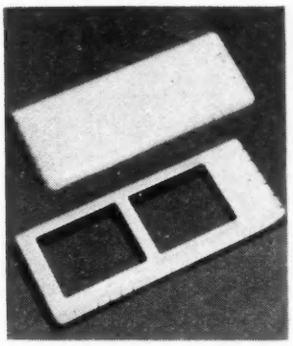
Colloidal Graphite in Smaller Particle Size

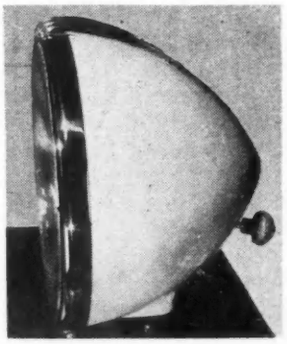
The Acheson Colloids Corp., Port Huron, Mich., has announced a new process for manufacturing its "Dag" colloidal graphite which it is claimed permits commercial production of graphite products having considerably smaller particle size and correspondingly improved suspension. Instead of a single grade as before, Acheson plans to market several, distinguished primarily by a range of particle sizes. The first, or top grade will contain particles ranging between one micron and the submicroscopic (1 micron = 0.00003937 in.). The particle size in this product is so minute that it may be said to border on true solution, although retaining all the valuable inherent qualities of solid graphite.

A further advantage pointed out by the producer is the availability of "dag" colloidal graphite in a considerably wider range of vehicles. In addition to water, petroleum, castor oil, glycerine and varnish, excellent

(Turn to page 684, please)

Automotive Plastics Awards





Designs for the Chrysler glove box door and instrument panel and a Westlite driving lamp took the second award and honorable mention, respectively, in the newly created "Transport Group in the Third Annual Modern Plastics Competition" conducted by *Modern Plastics*. For the former a new process was perfected and executed by Thermo-Plastics, Inc., St. Clair, Mich., using Tenite, a thermoplastic material furnished by the Tennessee Eastman Corp., Kingsport, Tenn., and die equipment made by the R. H. Freitag Mfg. Co., Akron. The parts were fabricated on injection machines built by the Hydraulic Press Mfg. Co., Mount Gilead, Ohio.

The prize-winning plastic lamp shell was designed by H. H. Bartels. Ander-Bar Mfg. Co., Sparta, Wis., used only one die to produce the molded shell, as against eight dies required to perform the drawing, trimming and piercing operations on a metal shell. The unit was molded by Thermo-Plastics, Inc., using plastic material produced by the Celluloid Corp., New York City, Tennessee Eastman Corp., and the E. I. du Pont de Nemours & Co., Inc. The mold for this job was made by the Quality Die & Mould Co., Detroit.

Electric Drives

WITH a registration of approximately 150, the S.A.E. National Transportation Engineering Meeting opened at the Hotel New Yorker in New York on Monday afternoon. There were two papers on the program for that session, one by F. S. Baster of the White Motor Company, on Trends in Engine Design, the other by F. B. Lautzenhiser of the International Harvester Co., on "Must the Six-Wheeler Die?" Mr. Lautzenhiser, however, had withdrawn his paper a short time before the meeting and Merril C. Horine of Mack Manufacturing Corporation had jumped into the breach with a paper dealing with tire sizes for commercial vehicles. F. K. Glynn, engineer of the American Telegraph and Telephone Company, presided at the session.

High Performance Engines

F. S. BASTER, chief engineer of The White Motor Company, presented a paper entitled, "Why Not 125 b.m.e.p. in an L-Head Truck Engine?" Mr. Baster said the efforts to increase the b.m.e.p. were not directed solely at making it possible to propel a larger pay load faster, but also aimed at a reduction in the fuel consumption; as a matter of fact, anything which tends to increase the b.m.e.p. also tends to reduce specific consumption.

The specific consumption is favorably affected by uniform mixture distribution, and uniformity of distribution in turn is influenced by condensation in the manifold. With the object of decreasing the influence of manifold condensation on distribution, Mr. Baster suggests the use of intake manifolds in which there is a single division zone, and that close to the carburetor, so that if any condensation takes place beyond this point, the condensate cannot get into any other cylinder than that for which it was intended. An inlet manifold embodying this feature is shown in Fig. 1. It has the further advantage of giving the shortest possible path from the carburetor to the inlet port, so that the wall area on which condensation can take place also is a minimum.

Reducing the length of the manifold branches permits of reducing their area somewhat (for equal resistance to flow). As the lengths of the different branches are different, consideration should be given to the possibility of equalizing resistances to flow by making the port areas different, and in the illustration these areas for the three branches of each half of the manifold bear to each other the relation 10:9:8, the longest branch having the largest area. The author mentioned that Mr. Voorhies of the Wilcox-Rich Co. proposes different valve timings for the different cylinders of a block to compensate for the effects of different lengths of the manifold branches.

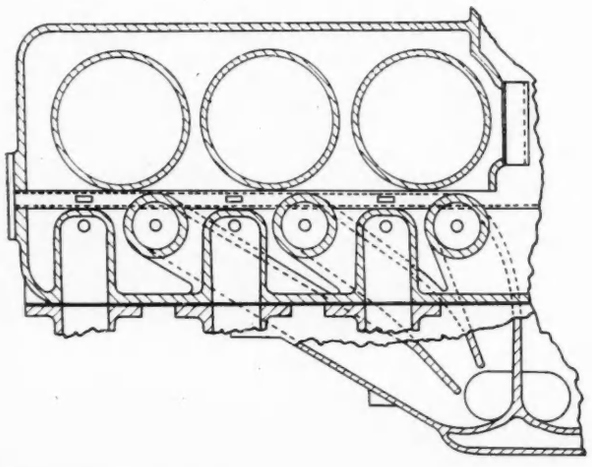


Fig. 1.—Intake manifold and ports.

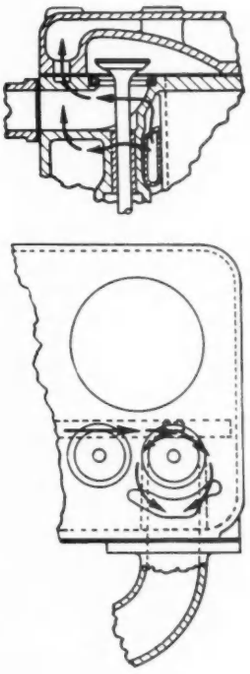


Fig. 2.—Diagram showing water flow adjacent to the exhaust valve.

A gradual increase in gas velocity upon approach to the valve seems to be beneficial to the flow, but it is the shaping of the inlet tract adjacent to the valve that is of major importance. A close approach to a true venturi is best, but this is difficult to accomplish, and the next best thing seems to be to provide a ⅛- or 3/32-in. radius at the offset at the port side of the valve seat. Where time permits it is advisable to make laboratory flow tests of port models. In such a study it is important to have the port-opening fitted with a triple-D venturi and the air outlet influenced by shapes which are replicas of the combustion chamber and cylinders. Also, the pressure drop across the inlet valve should be of the same order as in normal operation. Observations should be made with the valves both fully-lifted and half-lifted.

One factor affecting the flow of gas is the valve-seat angle. From the standpoint of ease of flow alone, the

and High Performance Engines

Among the Subjects Discussed at the National Transportation Engineering Meeting of the S.A.E. at New York

30-deg. seat has the advantage, but consideration must be given also to the ability of the valve to keep the seat clean, and from this point of view the 45-deg. seat has the advantage, due to the high rubbing velocity immediately before seating. In engines in which oil is prevented from making its way up the valve stem, and in which very little carbon therefore can form on the under side of the valve head, this consideration is of minor importance.

Such experimental development of the flow characteristics of the inlet passage may lead to an improvement of possibly 10 per cent. However, the whole of this gain will not be reflected in the increase in volumetric efficiency, which is dependent also on other factors, including the valve timing, compression ratio, and the temperatures of the various parts with which the incoming charge comes in contact.

Valve timing has been based upon a number of theories. In general, the power output can be increased by increasing the overlap, that is, opening the inlet earlier and closing the exhaust later. However, this also results in increasing the peaking speed. The point of inlet closing has an influence on the maximum permissible compression ratio, while that of exhaust opening has an influence on part-load economy.

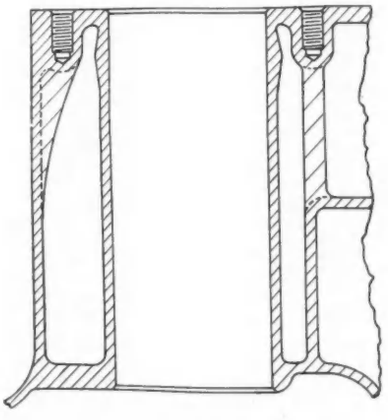


Fig. 3.—Typical stud anchorage.

For engines with hydraulic valve lifters the author proposed opening the inlet 15 deg. ahead of top center and closing it 35 deg. past bottom center; opening the exhaust 45 deg. ahead of bottom center and closing it 5 deg. past top center.

The highest useful compression ratio is limited principally by the effectiveness of the cooling of the parts with which the combustible charge comes in contact, such as the exhaust valves, pistons, and cylinders. Exhaust-valve cooling is favorably influenced by a high valve-spring pressure, a relatively long period during which the valve is on its seat, by absence of mechanical and thermal distortion, and by energetic water flow. The length of time the valve remains on its seat depends, of course, on the valve timing. Mr. Baster figures that in an engine with conventional valve tappets, where there is a long quieting ramp at each side of the cam lobe, this ramp starts to lift the valve when fully heated by continued full-throttle operation, 70 deg. of crank motion ahead of the point where it opens with the valve cold. With hydraulic tappens this approach ramp is not needed, and the valve therefore can remain on its seat 70 deg. of crank motion longer during each cycle of 720 deg. A further advantage of the hydraulic tappet is that, because of the absence of the ramp, it opens the valve much more rapidly at the beginning of the lift, and at a point, say, 70 crank degrees from the beginning of lift, the opening area is many times greater and the velocity of the exhaust gases past it will be less, which means less heating of the valve.

The author suggested that with hydraulic tappets, it might be found practical to use a valve angle of 30 deg. for the exhaust valves, which is considered impractical with ordinary tappets.

It will sometimes be found that valve stems wear on opposite sides at the top and bottom of the guide. This may be due to a lateral pressure exerted by the valve spring (ends of spring not absolutely square when under load), but it is more likely to be due to lack of alignment between the valve seat and guide. Such misalignment is caused by changes in temperature of the exhaust ports, and the remedy consists in more effective cooling of the valve pockets. One system of effective valve cooling is illustrated in Fig. 2. Some of the cooling water is discharged from the distributing header close to the exhaust-valve seat, between it and the cylinder wall. It is induced to flow completely around the valve and the port by scallops directly above the port and admission to the head jacket centrally above the port. Moreover, the distance between the water jacket and the valve seat is substantially constant over the entire circumference of the latter. The remainder of the cooling water is directed at the bottom of the valve pocket immediately adjacent to the upper end of the valve guide.

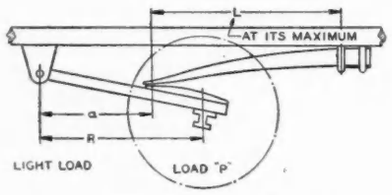
Cylinder distortion is another possible cause of trouble and may be due also to either mechanical or thermal causes. The most likely cause is an improper arrangement of the anchorages for the cylinder-head studs. A practical method of preventing such distortion is illustrated in Fig. 3. It will be noted that the anchorage is either directly in a wall extending straight down to the bottom of the cylinder barrel or is formed on an

external wall which is subsequently connected to the base of the cylinder barrel.

As regards ignition features, the author recommended wide gaps in spark plugs because of their effects on the ability to run on lean, economical mixtures; individual leads to the plugs not touching each other and not having grounded sheaths, coils of negative polarity, and high-tension cables with seven strands of 0.013-in. stainless wire. Variations in ignition timing should be minimized by either reducing the backlash or using a distributor brake.

Commercial-Vehicle Spring Practice

TRENDS in Commercial-Vehicle Spring Suspension was the title of a paper by N. E. Hendrickson, vice-president of the Mather Spring Co. After stating some of the basic principles of vehicular suspension. Mr. Hendrickson pointed to the difficulty arising in connection with commercial vehicles from the fact that the load on the springs varies within such wide limits. Whereas the load on passenger-car rear springs seldom increases more than 30 per cent over that with the driver only, in a 3-ton truck the rear-spring load may increase from 1400 to 7000 lb. when an overload



The Magnaflect spring suspension. Leverage $\frac{R}{a}$ magnifies load P so that load on spring becomes $\frac{R}{a} \times P$.

of 100 per cent is put on, and in a 30-passenger bus with rear-mounted powerplant the load on the front springs may increase from 1500 lb. with no passengers to 4200 lb. with a full complement of standees. In the case of the truck, with a static deflection of 5 in. under full load and "straight-line" or constant-rate springs, the rear end of the truck would have a frequency of oscillation of 84 per min. when loaded, and 188 when light, which represents a tremendous difference in the riding qualities. Similarly, with a static deflection of 6 in. for the front springs of the bus under maximum load, the frequency of oscillation would increase from 77 at full load to 128 at no load.

It is, of course, desirable to keep the difference between the frequencies at no load and full load, respectively, as small as possible, and various methods of reducing it have been devised. One consists in the use of two-stage springs, the regular springs being combined with helper springs which come into action after the load has reached a certain value and the regular springs flexed a certain amount. These helper springs are usually placed above the regular springs. Another method consists in the use of progressive springs, in which a number of auxiliary leaves are placed below the regular semi-elliptic spring and come into action gradually as the spaces between leaves in the unloaded condition are gradually closed up. A third method consists in the use of torsion bars on which the load is suspended through lever arms whose inclination to the horizontal, and, therefore, their effective length, varies with the load, the effective spring rate at the center of the wheel varying with the length of the lever arm, of course.

A still further method of compensating for changes in axle load is embodied in the Mather Magnaflect suspension (see drawing). It makes use of radius rods to hold the axle in position and of quarter-elliptic or half-elliptic cantilever springs to carry the load. When the vehicle is lightly loaded, the spring load is equal to R/a times the wheel load, whereas with a full load the spring contacts the cam directly over the axle and the spring load is then equal to the wheel load; besides, since the load is applied to the spring at a considerable distance from the free end, the spring is much stiffer. The author said several of these springs were being tested in active service, one at the front end of a 30-passenger Twin Coach, the others on the new dual-type coaches of the same make.

The author pointed out that in applying variable-rate springs, one must make sure that the rate does not increase any faster than the load, if the same degree of comfort as at light load is to be maintained. This is often overlooked in laying out two-stage suspensions for motor trucks; many helper springs are so stiff relative to the main springs as to cause serious discomfort to the driver and damage to the merchandise transported.

In recent years the tendency in the commercial-vehicle field has been toward longer and wider springs, the author said, and he credited the following advantages to this practice:

(a) Ample mechanical strength of spring eyes, because the main leaves can be heavy enough without fear of overstressing through their deflection range.

(b) Greater "column strength" in the main leaf, against the drive and torque forces.

(c) Less change in spring length with changing deflections, and consequently, in front springs, less effect on steering geometry.

(d) Less angular "wrap-up," since a given deflection due to torque reaction is effective over a longer beam.

Assuming a given deflection and stress, a longer spring usually weighs a trifle less, because the clamped section at the axle seat is a smaller proportion of the total weight.

Diesel-Electric Bus Drive

DURING the past 12 years some 3000 buses with electric drive have been placed in service in this country, according to G. W. Wilson of the Transportation Department of General Electric Co., who presented a paper on Diesel-electric bus drive. Of these buses approximately 250 were placed in service during the past 18 months, all of which were powered with Diesel engines.

Since electric drive was first applied to buses, the equipment has been made lighter, cheaper and more efficient. A 125-hp. electric transmission which has been used for most of the Diesel-electric buses comprises a generator bolted directly to the engine bellhousing, with its armature connected to the crankshaft through a steel-disc coupling which takes care of any slight misalignment. The engine-generator unit has a three-point support on the frame, in a plane passing approximately through its center of gravity. As all of the engine power is absorbed in the generator and no mechanical power is transmitted from it, there is no

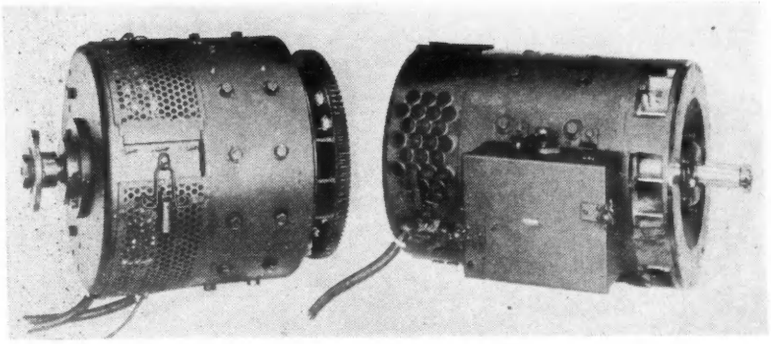


Fig. 1.—G.E. 125 hp. generator and motor of Diesel-electric drive

torque reaction to be taken care of.

In contrast to older generators of automotive electric drives, the generator has a small amount of compounding, which is said to eliminate the "slipping-clutch sensation" when accelerating from standstill under full throttle. The generator has six main and six commutating fields, and the armature core is made hollow to reduce weight. A receptacle provided on the generator permits of loading it with a water rheostat by merely pushing in a plug, which has been found handy for testing the powerplant in the garage. The weight of the 125-hp. generator with coupling is 765 lb.

The traction motor is a series motor with six main and six commutating poles. There are a large number of slots in the armature core and there are skewed to prevent magnetic hum. On buses with up to 20,000 lb. net weight and seating capacities up to 40, having driving wheels of 40-in. diameter, the motor is geared down 6⅛ to 1. Its weight is 930 lb. The total weight of the electric equipment is 1770 lb., or 14 lb. per engine hp., which compares with a specific weight of 24.4 lb. for a 90-hp. equipment built 10 years ago.

Fig. 1 shows the complete electric transmission unit, while Fig. 2 is a diagram of the electric circuits. It will be seen that there are relatively few outside electrical connections.

Curves of the over-all electrical efficiency of the equipment accompanying the paper showed that the efficiency is approximately 45 per cent at 5 m.p.h., 78 per cent at 10 m.p.h., 79 per cent at 20 m.p.h. and reaches a maximum of 83 per cent. It was pointed out that the low efficiency at low speeds is of no great consequence because of the rapidity with which the bus can be accelerated. Thus when starting under full throttle the electrical efficiency, starting from zero, reaches approximately 64 per cent in 5 sec., 78 per cent in 10 sec., and the maximum value of 83 per cent in little more than 25 sec.

Fig. 3 shows the variation of the propeller-shaft torque with vehicle speed, the lower curve showing the ratio in which the crankshaft torque is multiplied by the electric drive. Above 30 m.p.h. the electric drive gives an overdrive, the engine then turning at a lower speed than it would if geared to the drive wheels directly at the same ratio as used for the traction motor.

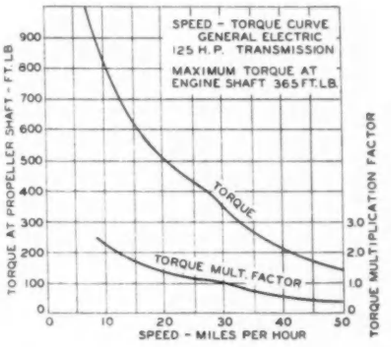


Fig. 3.—Speed-torque curve of G.E. 125 hp. transmission

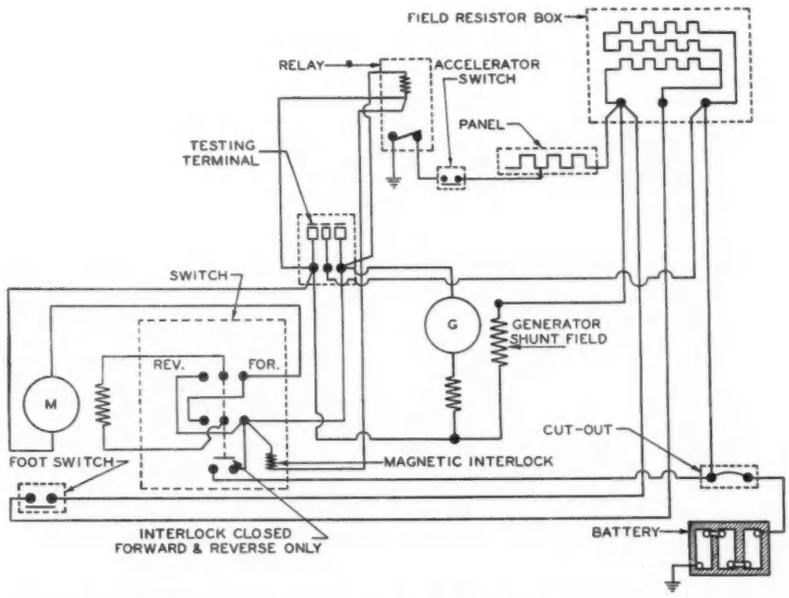


Fig. 2.—Connection diagram for G.E. 125 hp. bus transmission

Mr. Wilson stated that in the development of the system a number of difficulties had been encountered. One of these was due to excessive heat. Even the very efficient Diesel engine gives off as waste heat about three times the amount of energy which it converts into mechanical work, and electrical apparatus usually generates enough heat in itself to constitute a problem. Generator trouble caused by excessive heat is due in part to the direct coupling of the generator to the engine, but this has so many advantages that its abandonment would not be considered. For one thing, it permits of using the generator armature as a flywheel for the engine.

Difficulties were encountered also in obtaining an effective oil seal between the crankcase and the generator, and it has happened that generators have become oil-soaked. Wherever oil is present there is a tendency for dirt to accumulate; in this case the dirt clogs up the ven-

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GM Truck Line for 1939 Has Valve-in-Head Models

GENERAL MOTORS TRUCK & COACH DIVISION in its 1939 trucks makes use of new valve-in-head engines with higher compression ratio and in some cases larger displacement. For instance, the "239" engine has been replaced by a "248" of 4 per cent greater displacement, which, owing to the higher compression ratio used, has 21 lb-ft. greater maximum torque. The "257" engine has been replaced by the "248," which while having 9 cu. in. less displacement develops 6 lb-ft. more maximum torque. The increase in the compression ratio has been made possible by improvements in the compression chamber form. Domed pistons are now used, and the sides and top of the compression chamber converge from the ignition point, thereby placing the greater part of the chamber volume close to the ignition point and reducing the volume in the remote part of the chamber. All the larger engines, starting with the "278" now have seven crankshaft bearings instead of four. In these engines the total bearing area has been increased 68 per cent, and all bearings are of the interchangeable precision type. These engines have full-length water jackets and directed cooling of the hottest spots. In the larger engines a water-distributing pipe is cast in the cylinder block. Improvements have been made also in the lubricating systems. Oil pumps have been increased in capacity to take care of the larger bearing surfaces, and crank journals are cross drilled, so that the crankpin bearings are placed in communication with the main-journal inlet twice per revolution instead of once. Oil is supplied to the valve rocker arms under reduced pressure through an automatic valve. On the larger engines all oil pipes are replaced by oil passages drilled in the block. Oil filters are bolted to the crankcase.

For 1939 General Motors Truck is offering ten Diesel-powered models, five being conventional and five cab-over-engine models. The 500 series in the 3½-ton range and the 600 series both have the three-cylinder two-stroke General Motors Diesel engine, which has a displacement of 213 cu. in. and a torque rating of 263 lb-ft. The GMC 850 and 800 series carry the four-cylinder engine of 284 cu. in. displacement and a torque rating of 350 lb-ft. The same engine is carried on the 700 series, but in that case the injection capacity of the fuel injectors is limited and the torque rating is only 308 lb-ft.

A five-speed synchro-mesh transmission is either standard or available as an extra on all GMC medium- and heavy-duty trucks for 1939. It has helical gears in all speeds except low and reverse. This is said to be the first application of the synchro-mesh principle to transmissions for heavy-duty trucks. Both underdrive and overdrive are available.

The steering gears have been redesigned for faster steering with less effort. All cab-over-engine models in the 3½-ton and larger range and all conventional models in the 5-ton and larger range will be regularly equipped with a new ball-bearing steering gear. The latter is of the screw and nut type, the same as that used in the past, but steel balls are inserted

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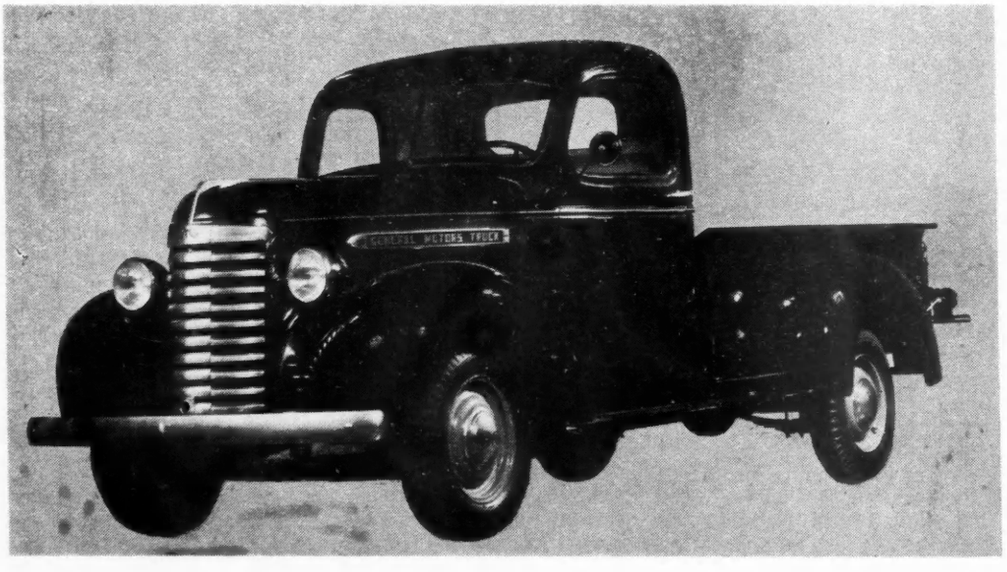
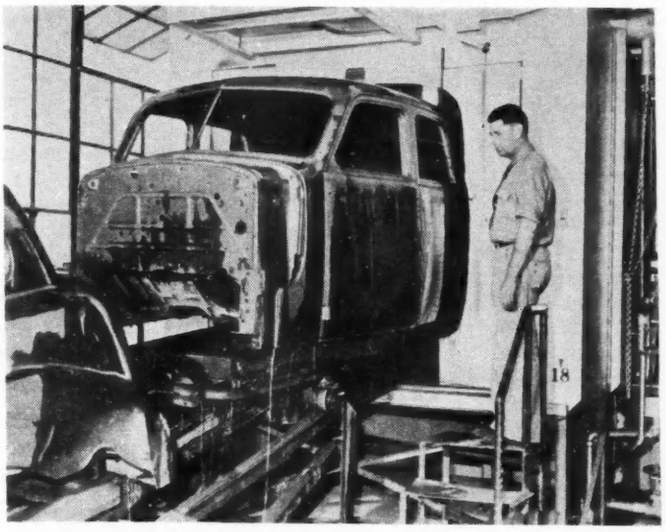


Half-ton pickup body on the new GM line has an all-steel body.



Bonderizing Oldsmobile bodies at the Fisher body plant Lansing, Michigan

Production Lines

Third Dimension

This year as never before we note the difficulty, almost the impossibility, of translating the eye-appeal of the new cars through the medium of photography. In several cases where our first glimpse of the new car came from a picture rather than a model, we were impressed by the fact that the car itself was ever so much better looking. Today our impression was fortified by the opinion of several outstanding advertising experts. In all probability, the difficulty lies in the fact that the plane dimension of the camera cannot but fail to reflect the subtle harmony of the curvature and fairing of sheet metal, die cast grilles, and the like. Looks like a job for the stereopticon or its equivalent from now on.

Miles Long

Along with a large party of newspaper men we took advantage of an invitation to tour some of the new facilities at the Ford Rouge plant, some of which still are in the process of construction. Impressive was the new tool and die shop which will serve the Ford industry. With the completion of the new facilities, Ford can boast over 150 miles of conveyors at the Rouge. We were amazed at the new body plant being erected adjacent to the steel mill. When it is in operation there will be the following sequence of events all under one roof—iron ore coming in on Ford lake boats enters the steel mill, follows through the mill and emerges in the form of sheet and strip for the body plant, fabricated in the body plant, painted, trimmed, and ready for transport to the assembly lines, all within a period of about 24 hours from the receipt of the iron ore at the dock.

Renews Jo-Blocks

Impressive achievement has been marked by the announcement that it is now possible to recondition Johansson gage blocks in all sizes. Johansson has been reconditioning blocks ranging from 5-in. and upwards. Now the service has been extended to include blocks from two inches upward. It is claimed that the process produces gage blocks to within their original accuracy. Cost is rather nominal—50 per cent of current net price for 2, 3, and 4-in. blocks; 25 per cent of blocks from 5 in. and upwards.

Lube Problems

Each season brings its own problems to the lubrication engineers and petroleum technologists. Sometimes they are new ones, adding more grist to the busy mill. Conversation with some of our friends in the oil industry reveals two basic problems that confront engine builders. The first is perennial—that of diesel engine sludging. The second looms on the horizon as a varnish or gum deposit in passenger car engines. Apparently this condition is aggravated by close clearances. Solution appears to lie in oils treated with additives, although some producers promise a complete solution through processing.

Social View

A fine piece of technical literature is offered industrial engineers and management in a new book, "Applied Time and Motion Study" by Walter G. Holmes, time study engineer, Timken-Detroit Axle Co., published by The Ronald Press. From a perspective of many years devoted to time study in automotive plants, the author has developed an excellent approach based on the viewpoint that the operator is a human being with skills, capabilities, limitations, all of which must be taken into account. With this guiding principle, the author shows that properly applied time and motion studies can be made one of the most powerful aids in the struggle for economical production costs, good quality levels. Much of the material is entirely new to the literature on this subject. Here for example is a complete discussion of fatigue, based on current knowledge. There is an excellent chapter on Seeing as related to cost and quality, noting the muscular fatigue due to eye strain, recommending the layout of work places and levels of illumination for best results.

Imposing high-lights—table showing time values, to four decimals, of body member movements, eyes, nerves, etc.; adoption of 24 therbligs with clarification of terms and usage; an operating analysis check list of 1180 items.

Some impression of the scope of this text may be gained from the following condensed lists of chapter headings—How to go about improving operations; qualifications and senses of the worker; work habits, skill and rhythm; fatigue from work; time study methods; leveling time study; the process chart; motion chart; motion analysis; analysis of motion pictures.—J. G.

Diesel-Electric Bus Drive

(Continued from page 681)

tilating passages, which leads to overheating and possibly to burning out of the generator.

Another difficulty encountered was due to the fact that most Diesel engines, instead of exhibiting the bulldog torque characteristics with which they have been credited, do not show any increase in torque with decrease in speed below 1400 r.p.m. and probably could not be operated through positive gearing at all. Mr. Wilson admitted that while the problem had been solved in a general way by changes in the generator and motor characteristics, even today it would be possible to get better results if the engine torque increased perceptibly with a decrease in speed from maximum to 75 per cent thereof.

One of the shortcomings of most fully automatic transmissions is their free-wheeling action when the engine throttle is closed. A recently completed development in electric braking bids fair to eliminate this difficulty, thereby providing greater safety on slippery pavements and relieving the friction brakes.

New Developments in Automotive Materials

(Continued from page 677)

dispersions in kerosene, carbon tetrachloride and similar light-viscosity fluids may be had. Heretofore, this has been impracticable because of rapid coagulation of the particles and consequent settling out of solution.

An Electrode For Cast-Iron

A heavily coated shielded arc electrode, called "Softweld," intended for correcting machining errors, filling up defects, and for producing a very soft machinable, drillable weld in gray cast-iron is being made by the Lincoln Electric Co., Cleveland. The electrode is 5/32 in. thick, 16 in. long, and is polished at the end.

The coating on this wire (a nonferrous alloy) is designed so as to cause the weld to flow over and bond to the cast-iron with a minimum of penetration or heating of the base metal.

Micarta and Natural Woods Are Combined

Durawood, a new material combining micarta and natural woods, is being manufactured by the Westinghouse Electric & Mfg. Co. The product is said to be tough and long-wearing. It is available in the popular wood designs: mahogany, oak, walnut and pine.

The material is furnished in sheets 48 in. by 96 in. It will not warp or spring when properly applied. The producer claims that Durawood is permanent and does not require resurfacing.

Resilient Safety Flooring Material

A new, resilient safety flooring material is now made by the Ohio Rubber Co., Willoughby, Ohio. It is composed of aluminum-oxide abrasive aggregates bonded into the surface of resilient rubber. Available in either tile or sheet form and various popular colors, the new safety flooring has a wide scope of applications on new or old floors of wood, concrete, terrazzo, marble, steel and other materials.

Chemical Found Useful As a Water Softener

A report of proceedings at the convention of the American Chemical Society tells of an oddity—a chemical discovered 100 years ago—that has recently been put to useful purposes. The chemical is "sodium-hexametaphosphate," and according to G. B. Hatch and Owen Rice it can be used to eliminate undesirable hardness in water. Only one to two parts of the material to a million parts of water are sufficient to hold calcium carbonate in suspension without depositing in radiators or water pipes even when the water is heated nearly to the boiling point. This treatment also has prevented after-precipitation when the water was first treated with ordinary hardness precipitating chemicals.

GM Truck Line for 1939 Has Valve-in-Head Models

(Continued from page 628)

between the threads of the screw and nut, which changes the sliding motion to rolling motion. With the increase in efficiency resulting from this change, it has been possible to reduce the reduction ratio, thus making steering faster.

A new model this year is the Special Delivery, which has a flat floor, a sliding door, and a single step, and is said to offer larger carrying capacity for a short wheelbase. Other features of the model include a folding-type form-fitting seat, good vision, and a rugged all-steel body.

A new low-priced cab introduced this year is said to be larger in every direction and consequently to offer more entrance space and greater leg room. It has a V-type windshield which is hinged at the top for ventilation. Reduced front-pillar width reduces the blind spots. The cab interior is finished in a new gun-metal gray crinkle, with upholstery to match. Both seat and back are adjustable. Rubberized hair pads for the seat cushions are now standard equipment.

The heavy-duty cabs used on conventional 3½-ton and larger models also have the improved seat construction with rubberized pads, encased window glass mounting, non-shatterable glass, gun-metal gray interior finish, and an improved three-point mounting designed to maintain hood fit and the clearance between the radiator and fan. Cabs for cab-over-engine models in the 1½-ton and larger range have these same features except that the mounting is four-point.

The ½ and ¾-ton models have more flexible springs, and front and rear shock absorbers are standard equipment. The frames of medium and heavy-duty models have been strengthened at the front, and new channel type bumpers have been designed. Frame sections generally are heavier on these models.